## NEPAL NATIONAL MICRONUTRIENT STATUS SURVEY

Government of Nepal
Ministry of Health and Population


## NATIONAL MICRONUTRIENT

 STATUS SURVEY

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## Summary table of findings

Nepal National Micronutrient Status Survey, 2016

| Sample Coverage and Response Rate |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Population group | Sample size |  |  |  |  |
|  | $\underset{N}{\text { Planned }^{\mathrm{a}}}$ | Available ${ }^{\text {b }}$ <br> N | Interview Completed ${ }^{\text {c }}$ N (\%) | $\begin{gathered} \text { Refused }^{\mathrm{d}} \\ \mathrm{~N}(\%) \end{gathered}$ | Respondent not at home after three attempts N (\%) |
| Household | 4,320 | 4,320 | 4,309 (99.7) | 5 (0.1) | 6 (0.1) |
| Children 6-59 months | 2,160 | 1,728 | 1,709 (98.9) | 5 (0.3) | 14 (0.8) |
| Children 6-9 years | 1,260 | 1,150 | 1,138 (99.0) | 3 (0.3) | 9 (0.8) |
| Adolescent boys 10-19 years | 1,080 | 1,045 | 1,025 (98.1) | 8 (0.8) | 12 (1.1) |
| Adolescent girls 10-19 years | 2,160 | 1,898 | 1,865 (98.3) | 9 (0.5) | 24 (1.3) |
| Non-pregnant women 15-49 years | 2,160 | 2,160 | 2,144 (99.3) | 8 (0.4) | 8 (0.4) |
| Pregnant women 15-49 years ${ }^{\text {b }}$ | 108 | 211 | 207 (98.1) | 1 (0.5) | 3 (1.4) |
| ${ }^{\text {a Based on survey design and sample size calculation }}$ <br> ${ }^{\mathrm{b}}$ Available sample in the clusters <br> ${ }^{\text {c }}$ Percentage based on available sample size <br> ${ }^{\mathrm{d}}$ Refused: Refused, sick and disabled |  |  |  |  |  |
| Housing Characteristics |  |  |  |  | Value |
| Average household size |  |  |  |  | 4.6 |
| Percentage of female respondent for households head |  |  |  |  | 68.3 |
| Percentage of households with electricity/solar power |  |  |  |  | 94.3 |
| Percentage of households with a mosquito net |  |  |  |  | 76.2 |
| Percentage of households that own: |  |  |  |  |  |
| A television |  |  |  |  | 58.7 |
| A mobile/landline phone |  |  |  |  | 94.0 |
| Agriculture land |  |  |  |  | 70.8 |
| Farm animals/livestock |  |  |  |  | 73.7 |


| Drinking Water and Sanitation | Value |
| :---: | :---: |
| Percentage of households using improved sources of drinking water | 95.2 |
| Percentage of households using improved sources of drinking water within 30 minutes round trip | 60.1 |
| Percentage of households using appropriate method to treat drinking water among those who treat drinking water | 68.3 |
| Percentage of households using improved sanitation facilities shared/not shared | 84.9 |
| Percentage of households with a specific place for handwashing where water and soap or other cleansing agent present | 52.5 |
|  |  |
| Household Food Security | Value |
| Percentage of food secure households | 59.1 |
| Percentage of households with mild food insecurity | 15.8 |
| Percentage of households with moderate food insecurity | 18.1 |
| Percentage of households with severe food insecurity | 7.0 |
|  |  |
| Practices of Infant and Young Child Feeding Among Children 6-23 months | Value |
| Percentage of children who were ever breastfed | 97.9 |
| Percentage of children with timely initiation of breastfeeding | 66.8 |
| Percentage of children 12-15 months with continued breastfeeding at 1 year | 94.3 |
| Percentage of children 20-23 months with continued breastfeeding at 2 years | 83.4 |
| Percentage of children 6-8 months with timely initiation of complementary foods | 79.4 |
| Percentage of children who received the minimum dietary diversity | 45.8 |
| Percentage of children who received the minimum meal frequency | 77.3 |
| Percentage of children who received the minimum acceptable diet | 38.0 |
| Percentage of children who were bottle fed | 11.3 |
|  |  |
| Dietary Diversity of Children 6-9 years, Adolescent Boys 10-19 years, Adolescent Girls 10-19 year and Women 15-49 years | Value |
| Percentage of children 6-9 years who received the minimum dietary diversity | 41.6 |
| Percentage of adolescent boys 10-19 years who received the minimum dietary diversity | 47.9 |
| Percentage of adolescent girls 10-19 years who received the minimum dietary diversity | 42.9 |
| Percentage of women 15-49 years who received the minimum dietary diversity | 48.8 |
|  |  |
| Nutrition Interventions | Value |
| Percentage of children 6-59 months who participated in growth monitoring in the last months | 8.1 |
| Percentage of children 6-59 months who consumed a vitamin A capsule during last campaign | 92.1 |
| Percentage of children 12-59 months who consumed a deworming tablet during last campaign | 87.3 |
| Percentage of children 6-59 months who consumed Baal Vita micronutrient powder in the last 7 days | 2.0 |
| Percentage of children 6-9 years who participated in school health and nutrition program | 16.6 |
| Percentage of adolescent boys 10-19 years who participated in school health and nutrition program | 17.1 |
| Percentage of adolescent girls 10-19 years who participated in school health and nutrition program | 17.6 |
| Percentage of women 15-49 years who gave birth in the last 5 years who had taken iron and folic acid tablets during last pregnancy | 90.8 |
| Percentage of women 15-49 years who gave birth in the last 5 years who had taken at least 180 iron tablets during last pregnancy | 77.2 |
| Percentage of women 15-49 years who gave birth in the last 5 years who had taken deworming tablet during last pregnancy | 59.0 |
| Percentage of women 15-49 years who gave birth in the last 5 years who had taken iron tablets during last post-partum period | 57.0 |
| Percentage of women 15-49 years who gave birth in the last 5 years who had taken a post-partum vitamin A capsule | 46.0 |

Percentage of children 6-59 months who had:
Acute inflammation (C-reactive protein (CRP) $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\alpha-1$ acid glycoprotein (AGP) $<1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.6
Chronic inflammation (AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ and $\mathrm{CRP}<5 \mathrm{mg} / \mathrm{L}$ ) ..... 18.1
Both acute and chronic inflammation (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\mathrm{AGP} \geq 1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 8.6
Percentage of adolescent boys 10-19 years who had:
Acute inflammation (C-reactive protein (CRP) $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\alpha-1$ acid glycoprotein (AGP) $<1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.7
Chronic inflammation ( $\alpha-1$ acid glycoprotein (AGP) $\geq 1.0 \mathrm{~g} / \mathrm{L}$ and CRP $<5 \mathrm{mg} / \mathrm{L}$ ) ..... 3.0
Both acute and chronic inflammation (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\mathrm{AGP} \geq 1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 2.5
Percentage of adolescent girls 10-19 years who had:
Acute inflammation (C-reactive protein (CRP) $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\alpha-1$ acid glycoprotein (AGP) $<1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.1
Chronic inflammation ( $\alpha-1$ acid glycoprotein (AGP) $\geq 1.0 \mathrm{~g} / \mathrm{L}$ and CRP $<5 \mathrm{mg} / \mathrm{L}$ ) ..... 4.3
Both acute and chronic inflammation (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.6
Percentage of non-pregnant women 15-49 years who had:
Acute inflammation (C-reactive protein (CRP) $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\alpha-1$ acid glycoprotein (AGP) $<1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 3.8
Chronic inflammation ( $\alpha-1$ acid glycoprotein (AGP) $\geq 1.0 \mathrm{~g} / \mathrm{L}$ and CRP $<5 \mathrm{mg} / \mathrm{L}$ ) ..... 3.6
Both acute and chronic inflammation (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\mathrm{AGP} \geq 1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.7
Percentage of pregnant women 15-49 years who had:
Acute inflammation (C-reactive protein (CRP) $\geq 5 \mathrm{mg} / \mathrm{L}$ and $\alpha-1$ acid glycoprotein (AGP) $<1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 12.6
Chronic inflammation ( $\alpha-1$ acid glycoprotein (AGP) $\geq 1.0 \mathrm{~g} / \mathrm{L}$ and CRP $<5 \mathrm{mg} / \mathrm{L}$ ) ..... 0.4
Both acute and chronic inflammation (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ ) ..... 1.7
Morbidity and Infectious Disease ..... Value
Prevalence of fever in the two weeks preceding survey
Percentage of children 6-59 months who had fever ..... 36.5
Percentage of children 6-9 years who had fever ..... 16.5
Percentage of adolescent boys 10-19 years who had fever ..... 10.8
Percentage of adolescent girls 10-19 years who had fever ..... 15.1
Percentage of non-pregnant women 15-49 years who had fever ..... 13.8
Percentage of pregnant women 15-49 years who had fever ..... 15.6
Prevalence of cough in the two weeks preceding survey
Percentage of children 6-59 months who had cough ..... 38.3
Percentage of children 6-9 years who had cough ..... 16.4
Percentage adolescent boys 10-19 years who had cough ..... 11.8
Percentage of adolescent girls 10-19 years who had cough ..... 18.4
Percentage of non-pregnant women 15-49 years who had cough ..... 14.6
Percentage of pregnant women 15-49 years had cough ..... 21.1
Prevalence of diarrhea in the two weeks preceding survey
Percentage of children 6-59 months who had diarrhea ..... 19.6
Percentage of children 6-9 years who had diarrhea ..... 6.3
Percentage of adolescent boys 10-19 years who had diarrhea ..... 7.0
Percentage of adolescent girls 10-19 years who had diarrhea ..... 8.5
Percentage of non-pregnant women 15-49 years who had diarrhea ..... 9.2
Percentage of pregnant women 15-49 years who had diarrhea ..... 5.8
Prevalence of Helicobacter pylori
Percentage of children 6-59 months who had H. pylori in stool sample ..... 19.7
Percentage of adolescent boys 10-19 years who had H. pylori in blood sample ..... 13.6
Percentage of adolescent girls 10-19 years who had H . pylori in blood sample ..... 15.9
Percentage of non-pregnant women 15-49 years who had H. pylori in stool sample ..... 40.0
Prevalence of Soil Transmitted Helminths (STHs)Percentage of children 6-59 months suffering from STH11.9
Percentage of non-pregnant women 15-49 years suffering from STHs ..... 18.6

## Prevalence of alpha-thalassemia

Percentage of children 6-59 months with alpha-thalassemia 2.0
Percentage of non-pregnant women 15-49 years with alpha-thalassemia 0.7
Prevalence of beta-thalassemia
Percentage of children 6-59 months with beta-thalassemia 5.3
Percentage of non-pregnant women 15-49 years with beta-thalassemia 3.1
Prevalence of sickle cell
Percentage of children 6-59 months with sickle cell 0.3
Percentage of non-pregnant women 15-49 years with sickle cell 0.7
Prevalence of G6PD Deficiency
Percentage of children 6-59 months with G6PD deficiency 17.9
Percentage of non-pregnant women 15-49 years with G6PD deficiency 13.5


[^0]| Vitamin A Deficiency by Modified Relative Dose Responses (MRDR) | Value |
| :---: | :---: |
| Percentage of children 6-59 months (MRDR $\geq 0.060$ ) | 4.2 |
| Percentage of non-pregnant women 15-49 years (MRDR $\geq 0.060$ ) | 3.0 |
| Zinc Deficiency | Value |
| Percentage of children 6-59 months (serum zinc $<65 \mu \mathrm{~g} / \mathrm{dL}$ or $57 \mu \mathrm{~g} / \mathrm{dL}$, inflammation adjusted) | 20.7 |
| Percentage of non-pregnant women 15-49 years (serum zinc<66 $\mu \mathrm{g} / \mathrm{dL} \mathrm{or} 59 \mu \mathrm{~g} / \mathrm{dL}$ ) | 24.3 |
| Red Blood Cell (RBC) Folate Deficiency and Insufficiency | Value |
| Percentage of children 6-59 months with RBC folate deficiency ( $<226.5 \mathrm{nmol} / \mathrm{L}$ ) | 1.0 |
| Percentage of adolescent girls 10-19 years with RBC folate deficiency using megabolastic anemia as a hematological indicator ( $<226.5 \mathrm{nmol} / \mathrm{L}$ ) | 6.1 |
| Percentage of non-pregnant women 15-49 years with RBC folate deficiency using megabolastic anemia as a hematological indicator ( $<226.5 \mathrm{nmol} / \mathrm{L}$ ) | 4.5 |
| Percentage of children 6-59 months with risk of RBC folate deficiency ( $<305 \mathrm{nmol} / \mathrm{L}$ ) | 5.8 |
| Percentage of adolescent girls 10-19 years with risk of RBC folate deficiency ( $<305 \mathrm{nmol} / \mathrm{L}$ ) | 16.2 |
| Percentage of non-pregnant women 15-49 years with risk of RBC folate deficiency ( $<305 \mathrm{nmol} / \mathrm{L}$ ) | 11.5 |
| Percentage of adolescent girls 10-19 years with RBC folate insufficiency for preventing neural tube defects (<906 nmol/L) | 95.8 |
| Percentage of non-pregnant women 15-49 years with RBC folate insufficiency for preventing neural tube defects ( $<906 \mathrm{nmol} / \mathrm{L}$ ) | 89.6 |
| Urinary Iodine Concentration (UIC) | Value |
| Median UIC among children 6-9 years | 314.1 |
| Median UIC among non-pregnant women 15-49 years | 286.2 |
| Median UIC among pregnant women 15-49 years | 241.3 |
| Household Use and Purchase of Salt and Household Salt Iodization | Value |
| Percentage of household using: |  |
| Refined salt | 87.6 |
| Crystal salt | 11.9 |
| Crushed salt | 4.1 |
| Percentage of household who used crystal salt reported washing the salt before use | 45.7 |
| Percentage of all salt samples with iodine level more than 15 ppm | 90.7 |
| Percentage of all salt samples with iodine level more than 40 ppm | 67.5 |
| Percentage of all crystal salt samples with iodine level more than 15 ppm | 46.4 |
| Percentage of all crystal salt samples with iodine level more than 40 ppm | 7.7 |
| Percentage of all refined salt samples with iodine level more than 15 ppm | 97.4 |
| Percentage of all refined salt samples with iodine level more than 40 ppm | 75.5 |
| Percentage of all crushed salt samples with iodine level more than 15 ppm | 97.6 |
| Percentage of all crushed salt samples with iodine level more than 40 ppm | 51.9 |


| Household Use and Purchase of Wheat Flour and Iron Content in Wheat Flour | Value |
| :--- | ---: |
| Percentage of households that grow wheat | 58.7 |
| Percentage of households purchasing: <br> Maida flour <br> Atta flour | 45.4 |
| Percentage of purchased household Maida flour samples testing positive <br> for iron content by iron spot test <br> Percentage of purchased household Atta flour samples testing positive <br> for iron content by iron spot test | 43.0 |
| Percentage of household wheat flour samples meeting Nepal's food standard <br> for iron content ( $\geq 60$ mg/kg): <br> All purchased flour samples <br> Purchased Maida flour samples <br> Purchased Atta flour samples | 19.5 |
|  | 35.5 |
| Household Use and Purchase of Other Fortifiable Food Vehicles | 36.8 |
| Percentage of households consuming noodles | 13.3 |
| Percentage of households using: | 35.8 |
| Mustard oil <br> Sunflower oil <br> Soybean oil | Value |
| Percentage of households using: | 95.1 |
| Home produced pounded rice | 65.7 |
| Small local milled rice | 24.2 |
| Rice from commercial/large scale mill (industrial rice) | 9.2 |
| Percentage of households consuming biscuits/cookies | 12.9 |

# Ramshahpath, Kathmandu Nepal 

Ref.:
Date: 2075•04.31.


#### Abstract

PREFACE

I am extremely delighted with the successful completion of the 2016 Nepal National Micronutrient Status Survey (NNMSS) as it provides up-to-date, detailed information regarding the overall nutrition status of children, adolescents, pregnant and non-pregnant women of reproductive age with special focus to micronutrient status. This survey will bridge the evidence gaps related to the micronutrient status of children and women as the last NNMSS survey was done almost 20 years ago in 1998, and the available data from the survey cannot be used for evidence-based decision making today. With the availability of new information, we will be able to revise and update existing policy, strategy and plans on nutrition to achieve the Sustainable Development Goals by 2030.

I highly appreciate and commend the hard work and persistent efforts of all institutions and individuals involved in this survey. I would like to especially thank the Department of Health Services (DoHS) for taking the lead in the survey and providing technical support and guidance through the NNMSS Steering Committee.

The survey is the result of our continuous collaboration with the United States Agency for International Development (USAID), United States Centers for Disease Control and Prevention (CDC) and United Nations Children's Fund (UNICEF).I would like to thank our external development partners and donor agencies along with the New ERA, the national survey organization, for their support in the survey.


I hope that the results from the survey will be translated into better policy and strategy in the future.

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## FOREWORD

Nepal is committed to improving the situation of children, adolescents and women in Nepal as a signatory of Nepal is committed to improving the situation of children, adolescents and women in Nepal as a signatory of the 1990s World Summit for Children (WSC). Its commitment is re-iterated in the 2001 World Fit for Children (WFC) goal on micronutrient deficiency control and prevention in line with the United Nations Millennium Declaration: (1) the virtual elimination of vitamin A deficiency, iodine deficiency disorders and the reduction in the prevalence of iron deficiency anemia by one third of the 1990s levels. During the MDG Era, Nepal implemented several evidence-based micronutrient interventions at scale and carried out periodic monitoring of the performance of these micronutrient programs. National surveys assessing the program performance included the Nepal National Micronutrient Status Survey (1998), the Nepal Demographic Health Surveys (NDHS) (2001, 2006, 2011 and 2016), the Nepal Iodine Deficiency Disorder Status Survey (2005) and the National Multiple Indicator Cluster Survey (2014). The Nepal National Micronutrient Status Survey (2016) is the latest survey in this chain, which provides a wealth of current data on the micronutrient status of the most vulnerable populations: children, adolescent girls and boys, and pregnant and non-pregnant reproductive age women. Some of the information generated from this survey, e.g. blood disorders, zinc deficiency and H. pylori infection, was never available before at national level. This survey will help policy makers and planners understand the nutrition status and inform development of evidence-based policies, strategies and plans, including the Multi SectorNutrition Plan (MSNP) 2 (2018-2022).

Sustaining past achievements is always challenging. On the solid foundation of achievements from the Millennium Development Goal (MDG), Nepal must accelerate towards achieving the Sustainable Development Goal (SDG) 2: Zero Hunger. It must achieve the World Health Assembly (WHA) global targets on stunting, anemia, low birth weight, overweight, breastfeeding and wasting by 2025. Under this context, there is increased need for nutrition related data and information for use by the policy makers and planners working under three layers of the governance system in Govemment of Nepal to develop and update national nutrition policies, strategies and plans. This survey serves in meeting the information needs of the policy makers and planners. This report will be a reference material for policy makers, planners and decision makers as well as Govemment of Nepal.

I deeply appreciate the United States Agency for International Development (USAID), United States Centers for Disease Control and Prevention (CDC) and United Nations Children's Fund (UNICEF) for providing the financial and technical assistance to carry out such an important survey. In addition, my appreciation also goes to the European Union (EU) for providing financial contribution for the survey. I highly appreciate and commend the efforts of all institutions and individuals involved during the different phases of the survey and sample analysis. Finally, my sincere appreciation also goes to New ERA for managing technical, administrative, and logistical aspects of the survey and bringing such a valuable report of present time for the country.


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## ACKNOWLEDGEMENT

The Nepal National Micronutrient Status Survey (NNMSS) 2016 is the result of sincere and dedicated efforts of many institutions and individuals at various levels. The survey was conducted under the leadership of Family Welfare Division (FWD), Department of Health Services (DoHS), Ministry of Health and Population (MoHP). The United States Agency for International Development (USAID), United States Centers for Disease Control and Prevention (US CDC, Atlanta) and UNICEF provided technical and financial assistance for the survey. In addition, European Union (EU) also contributed financial support for the survey. New ERA, National Survey Organization (NSO), assisted Ministry of Health and Population, Government of Nepal to implement the survey in year 2016-2018.

Under this context, we express our gratitude to NNMSS Steering Committee, Working Group, Core Group, Expert Group, Principle Investigators (PIs) and Co-Principle Investigators (Co-PIs) for providing their strategic guidance and technical inputs during the various phases of survey implementation and data analysis. We would like to extend our sincere thanks to Dr. Senendra Raj Upreti (Former Secretary, MoHP); Dr. Rajendra Prasad Pant (Former Director General of DoHS); Former Directors of CHD: Dr. Bikash Lamichhane and Dr. Krishna Poudel; Former Nutrition Section Chiefs of CHD: Mr. Giriraj Subedi and Mr. Rajkumar Pokhrel; and existing Nutrition Section Chief Mr. Kedar Parajuli for providing the overall guidance and support in the survey. We would like to express our sincere gratitude to Dr. Pushpa Chaudhary, Health Secretary for her guidance to complete the survey.

We would like to express my gratitude to Ms. Shanda Steimer (Former Director, Office of Health and Education, USAID Nepal) Daniel Sinclair (Former Deputy Director, Health, USAID Nepal), Mr. Hari Koirala (Former Senior Nutrition Specialist, USAID Nepal) and Mr. Debendra P. Adhikari (Senior Nutrition Specialist, USAID Nepal) for ensuring technical and financial support for the survey. I would like to extend my gratitude to Ms. Carrie Rasmussen (Director, Health Office, USAID Nepal), Daniel VerSchneider (Deputy Director, Health Office, USAID Nepal) and Ms. Monica Villanueva (Maternal and Child Health Team Leader, USAID Nepal) for their continuous support for the survey till its dissemination.

We would particularly like to thank Dr. Maria Elena Jefferds (Behavioural Scientist, CDC, United States), Dr Ralph Donnie Whitehead, Jr. (Health Specialist, CDC, United States) and Dr Zuguo Mei (Epidemiologist, CDC, United States) for their technical assistance during entire period of survey designing to report dissemination.

We would like to express our gratitude to UNICEF Nepal Country team, led by Mr. Tomoo Hozumi, Representative, UNICEF Nepal for their overall support in the survey. Special thanks go to Mr. Stanley Chitekwe (Chief, Nutrition Section); Nutrition and Communication team: Mr. Naveen Paudyal, Mr. Anirudra Sharma, Mr. Pradiumna Dahal, Mr. Sanjay Rijal, Mr. Gyan Bahadur Bhujel, Mr. Binod Nepal, and Mr. Mukunda Nepal whose tireless efforts in survey management, technical inputs and coordination helped to successfully complete the survey. NNMSS team members Dr. Rajendra Kumar B.C and Mr. Lokendra Shamsher Thapa are acknowledged for their support in the survey.

We would like to express our gratitude to core study team of New ERA: Team Leader, Ms. Nira Joshi; Research Officers: Mr. Umesh Ghimire, Ms. Sandhya Sahi, and Mr. Ramesh Dangi; Data Processing Officer, Ms. Ramita Shakya; Anthropometry Trainer, Mr. Babu Raja Dangol, and Word Processing Officer, Mr. Sanu Raja Shakya. We would also like to thank Mr. Jagat Basnet, Executive Director of New ERA for his guidance to the team throughout the survey period. Our special thanks go to quality control team, and other field staff of New ERA for their determined sincere efforts and extremely dedicated hard work to successfully conducting such a large-scale complex survey.

Finally, we would like to express our sincere thanks to all who directly or indirectly supported the survey and helped to bring the report in this form. Special thanks go to all laboratories that provided their services during bio-sample and food sample analysis. I anticipate that the evidence generated from the survey will help to develop better policy for the improvement of nutrition status of children, adolescent, pregnant and non-pregnant women of Nepal.

Dr. RP Bichha
Director
Family Welfare Division

Ref. No.


## PREAMBLE

The first National Micronutrient Status Survey (NNMSS) was carried out in 1998. Since then, Nutrition Section of MoHP rolled out several nutrition interventions like National Vitamin 'A' Program, Iron Deficiency Anemia Prevention and Control Program, Iodine Deficiency Disorder Prevention and Control Program, Maternal and Infant and Young Child Feeding Program (MIYCN) and Integrated Management of Acute Malnutrition (IMAM) Programto uplift the nutrition status of children and women. However, there was growing feeling among the nutrition stakeholders about the huge information gap on the change in micronutrient status among children, adolescent boys and girls, pregnant and non-pregnant women in Nepal due to absence of fresh micronutrient status survey for long time.

Under the context, Nutrition Section of Ministry of Health and Population (MoHP) initiated a discussion with its external development partners, donor agencies and research agencies at national and global level in 2009. In response, United States Agency for International Development (USAID), United States Centers for Disease Control and Prevention (US CDC, Atlanta) and United Nations Children's Fund (UNICEF) expressed their commitment to support Ministry of Health and Population for the survey. In addition to Government's allocated fund, all partners as above ensured funding contribution for the survey by 2015 and major financial contribution for the survey was from the United States Agency for International Development (USAID). Besides, EU also provided financial support for the survey in year 2016.

Upon ensuring financial resource for the survey, Ministry of Health and Population (MoHP) decided to implement Nepal National Micronutrient Status Survey on date 14 September 2014 and formed Nepal National Micronutrient Status Survey (NNMSS) Steering Committee, Working Group, Core Group and expert group. Then Director General of DoHS took the lead of the survey as Principle Investigator and Nutrition Section of MoHP coordinated the survey as member secretary. United States Centers for Disease Control and Prevention (US CDC, Atlanta) took the lead in the technical assistance for the survey, whereas USAID and UNICEF provided day to day technical assistance at country level. The NNMSS Steering Committee provided overall guidance for the survey through its steering committee meetings ( 7 meetings) and technical working group provided its technical guidance for the survey through its working group meetings ( 7 meetings). The core group and expert group get activated as per need during the survey. Also, Nepal Health Research Council (NHRC) provided ethical clearance for the survey on 18 February 2016.New ERA received responsibility to implement the survey and then, prepare NNMSS report.

Because of all these arrangement, it could be possible to implement the survey within the timeframe of three years, 2016-2018 and the final report is now available for the wider dissemination. The complexity of the survey is well understood with the engagement of 6 pathology laboratories and one food laboratory located at various part of globe. In addition, it required to receive support from WARUN laboratory and IOM, Maharajgunj to manage the bio-sample storage during the samples transfer from field to NPHL for long term storage.

I am feeling my pleasure to share this novel work with you and like to express my thanks to all who helped to successfully implement the survey in Nepal.


Mr. Kedar Parajuli
Chief
Nutrition Section
Family Welfare Division

## Steering Committee,

## Technical Working

## Committee, Expert Group

## and Core Study Members

## NNMSS Steering Committee

1. Director General, Department of Health Services
2. Chief, Policy Planning and International Cooperation Division
3. Joint Secretary, Social Development Division, National Planning Commission
4. Chief, Monitoring and Evaluation Division, Ministry of Health and Population
5. Director, Child Health Division
6. Director, Family Health Division
7. Director, Logistics and Management Division
8. Director, National Health Training Center
9. Director, National Public Health Laboratory
10. Chairperson, Nepal Health Research Council
11. Director, Health Office, USAID Nepal
12. Chief, Nutrition Section, UNICEF
13. Representative, World Health Organization
14. Executive Director, New ERA
15. Chief, Nutrition Section, Child Health Division

Chairperson
Member
Member
Member
Member
Member
Member
Member
Member
Member
Member
Member
Member
Member
Secretary

## NNMSS Technical Working Committee

| 1. | Director, Child Health Division | Chairperson |
| :--- | :--- | :--- |
| 2. | Chief, Planning and Monitoring Section, Child Health Division | Member |
| 3. | Senior Public Health Officer, Nutrition Section, Child Health Division | Member |
| 4. Senior Officer, National Public Health Laboratory | Member |  |
| 5. Nutrition Technical Committee Coordinator | Member |  |
| 6. Nutrition Research Officer, Nepal Health Research Council | Member |  |
| 7. Chief, Cold Chain Section, Logistics and Management Division | Member |  |
| 8. Nutrition Specialist, USAID Nepal | Member |  |
| 9. Representative, UNICEF | Member |  |
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## Acronyms and Abbreviations

| AGP | al-Acid Glycoprotein |
| :---: | :---: |
| CBC | Complete Blood Count |
| CDC | Centers for Disease Control and Prevention |
| CRP | C-Reactive Protein |
| ECD | Early Childhood Development |
| FCHV | Female Community Health Volunteer |
| FFP | Food for Peace |
| G6PD | Glucose-6-phosphate Dehydrogenase |
| GIS | Geographic Information System |
| GMP | Growth Monitoring and Promotion |
| GPS | Global Positioning System |
| H. Pylori | Helicobacter pylori |
| IDA | Iron Deficiency Anemia |
| IDD | Iodine Deficiency Disorders |
| IMAM | Integrated Management of Acute Malnutrition |
| IYCF | Infant and Young Child Feeding |
| KISAN | Knowledge-based Integrated Sustainable Agriculture and Nutrition |
| MCHN | Maternal Child Health and Nutrition |
| MIYCN | Maternal, Infant and Young Child Nutrition Program |
| MNP | Micronutrient Powders |
| MoHP | Ministry of Health and Population |
| MRDR | Modified Relative Dose Response |
| MSNP | Multi Sector Nutrition Plan |
| NDHS | Nepal Demographic Health Survey |
| NIDDSS | Nepal Iodine Deficiency Disorders Status Survey |
| NMSS | Nepal Micronutrient Status Survey |
| NNMSS | Nepal National Micronutrient Status Survey |
| NPHL | National Public Health Laboratory |


| ODF | Open Defecation Free Movement |
| :--- | :--- |
| PEM | Protein Energy Malnutrition |
| RBC | Red Blood Cell |
| RBR | Retinol Binding Protein |
| SLC | School Leaving Certificate |
| sTfR | Soluble Transferrin Receptor |
| STH | Soil Transmitted Helminthes |
| UI | Urinary Iodine |
| UIC | Urinary Iodine Concentration |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| USI | Universal salt iodization |
| VAD | Vitamin A Deficiency |
| VDC | Village Development Committees |
| WFP | World Food Program |
| WHO | World Health Organization |

# Executive Summary 

## Introduction

The Nepal National Micronutrient Status Survey (NNMSS) assessed micronutrient status among representative populations in Nepal, including specifically the status of vitamins A, iron, folic acid, iodine, zinc and the condition of anemia. To assess nutritional status and understand factors related to micronutrient status and anemia, the survey also collected information on anthropometry, infectious diseases (malaria, Soil Transmitted Helminths (STH), Helicobater Pylori (H. pylori), visceral leishmaniasis), blood disorders, and markers of inflammation. Additionally, the survey provided information on process and outcome indicators of priority for national supplementation and fortification interventions, and other key nutrition interventions in the country.

## Summary Results

## Household and Individual Characteristics of Survey Population

A total of 4,309 households participated in the survey and included 1,709 children 6-59 months, 1,138 children 6-9 years, 1,025 adolescent boys 10-19 years, 1,865 adolescent girls 10-19 years, and 2,351 women 15-49 years ( 207 were pregnant and 2,144 were non-pregnant). Overall, 94 percent of the households had access to electricity, 60 percent had access to an improved source of water within 30 minutes of roundtrip, and about 85 percent of the households had an improved toilet facility. Three-fourths of the households had mosquito nets. Possession of mobile/landline phones was very high with 94 percent of households possessing at least one phone.

Seven in ten households owned agricultural land and three-fourths owned some livestock or poultry. Fifty-nine percent of households were food secure, 16 percent mildly insecure, 18 percent moderately insecure, and seven percent were severely food insecure.

## Infant and Young Child Feeding Practices and Dietary Diversity among Children 6-9 years, Adolescent Boys 10-19 years, Adolescent Girls 10-19 years and Women 15-49 years

Breastfeeding is nearly universal in the country and two-thirds of the children were breastfed within one hour of birth. More than nine in ten ( 94 percent) children 6-23 months were currently breastfeeding. Similarly, 94 percent of children 12-15 months were continuing to breastfeed at 1 year of age and 83 percent of children 20-23 months were continuing to breastfeed at 2 years of age. Eleven percent of children 6-23 months were bottle-fed and the prevalence of bottlefeeding was 21 percent in urban areas.

Almost eight in ten children 6-8 months of age received timely introduction of complementary foods. Among children 6-23 months, 46 percent received the minimum dietary diversity (at least four food groups out of seven recommended food groups), 77 percent received the minimum meal frequency appropriate for their age, and 38 percent met the criteria of minimum acceptable diet (both minimum dietary diversity and minimum meal frequency).

Among children 6-9 years, adolescent boys and girls aged 10-19 years, and women 15-49 years, the consumption of the minimum dietary diversity (at least five food groups out of recommended ten food groups) the previous day was similar across all population groups ranging from 42 percent among children 6-9 years to 49 percent among women 15-49 years. The proportion of all groups meeting the minimum dietary diversity was lower in rural areas.

## Nutrition Interventions

Among children 6-59 months, over nine in ten (92 percent) received a vitamin A capsule and 87 percent received the deworming tablets in the last mass distribution campaign. Two percent of children 6-23 months consumed micronutrient powder sachets locally branded as "Baal Vita" during the 7 days prior to the survey. Participation in school health program among children 69 years, adolescent boys 10-19 years, and adolescent girls 10-19 years ranged from 17 to 18 percent.

Among women 15-49 years who had given birth in the last 5 years, nine in ten reported taking iron tablets during their last pregnancy and 77 percent of them reported consuming the recommended dose of at least 180 tablets. Overall, six in ten reported taking deworming medicine during pregnancy, 57 percent had taken post-partum iron tablets and 46 percent had consumed a post-partum vitamin A capsule.

## Inflammation Status

NNMSS assessed inflammation status among all population groups except children 6-9 years. The prevalence of no inflammation (assessed using C-reactive protein (CRP) and $\alpha-1$ acid glycoprotein (AGP)) ranged from 91 to 93 percent among the adolescent boys 10-19 years, adolescent girls 10-19 years and non-pregnant women 15-49 years. There was no inflammation among 85 percent of pregnant women 15-49 years or among 72 percent of children 6-59 months.

## Morbidity and Infectious Disease

Morbidity indicators for fever, cough and diarrhea during the two weeks prior to the survey were reported by the mother for children 6-59 months and self-reported for other population groups. The prevalence of fever ranged from 37 percent among children 6-59 months to 11 percent among adolescent boys 10-19 years. Likewise, the prevalence of cough ranged from 38 percent in children 6-59 months to 12 percent among adolescent boys $10-19$ years and
prevalence of diarrhea ranged from 20 percent among children 6-59 months to six percent each among children 6-9 years and pregnant women 15-49 years.

Helicobacter pylori infection among children 6-59 months and non-pregnant women 15-49 years was assessed in stool samples and among adolescents 10-19 years in blood samples. The prevalence of $H$. pylori is 40 percent among non-pregnant women 15-49 years, 20 percent among children 6-59 months, 16 percent among adolescent girls 10-19 years, and 14 percent among adolescent boys 10-19 years.

Visceral Leishmaniasis (also known as Kala-Azar) was tested in children 6-59 months and nonpregnant women $15-49$ years. The prevalence of a positive test was 0.1 percent among children 6-59 months and 0.4 percent among non-pregnant women 15-49 years. Further, there were no cases of malaria infection among all population groups tested (children 6-59 months, adolescent boys 10-19 years, adolescent girls 10-19 years and women 15-49 years).

Overall, 19 percent of non-pregnant women 15-49 years and 12 percent of children 6-59 months had soil transmitted helminth infection. Among the three different types of worms tested, ascaris was the most prevalent in both groups (18 percent among non-pregnant women 15-49 years and 11 percent among children 6-59 months), followed by hookworm infestation (one percent in both groups) and trichuris trichura (less than one percent in both groups).

## Blood Disorder Status

Blood disorders were assessed among children 6-59 months and non-pregnant women 15-49 years. Among children 6-59 months and non-pregnant women 15-49 years, 18 percent and 14 percent, respectively, had Glucose-6-phosphate dehydrogenase deficiency (G6PD). Overall, two percent of children 6-59 months and less than one percent of non-pregnant women 15-49 years were carriers for $\alpha$ thalassemia, five percent of children 6-59 months and three percent of non-pregnant women 15-49 years had $\beta$ thalassemia minor, less than one percent each of children 6-59 months and non-pregnant women 15-49 years were carriers for sickle cell or had sickle cell trait (HbAS). Around one percent of children 6-59 months and two percent of nonpregnant women 15-49 years had Hemoglobin E.

## Anthropometry Status

Anthropometry status (length/height and weight) was measured among children 6-59 months, adolescent boys 10-19 years, adolescent girls 10-19 years and non-pregnant women 15-49 years. Nationally, 35 percent of children 6-59 months suffer from stunting, 29 percent underweight and 11 percent wasting. Severe stunting, severe underweight and severe wasting was 15 percent, eight percent and two percent among children 6-59 months respectively.

Overall, one-third of the adolescent boys and adolescent girls aged 10-19 years (32 percent each) suffer from stunting. One in ten adolescent boys 10-19 years and eight percent of adolescent girls $10-19$ years suffer from severe stunting. Wasting was 23 percent among adolescent boys 10-19 years and 14 percent among adolescent girls 10-19 years. Overweight among adolescent boys and girls ranged from $4-5$ percent while obesity among adolescent boys and girls were very low at one percent each.

Among non-pregnant women 15-49 years, 11 percent had short stature (shorter than 145 cm ), 15 percent were thin or underweight, 19 percent were overweight and five percent were obese. Overweight was more common among women 15-49 years in urban areas.

## Anemia, Iron Deficiency and Iron Deficiency Anemia Status

Anemia, iron deficiency and iron deficiency anemia was assessed among all population groups except children 6-9 years. The prevalence of anemia assessed by hemoglobin concentration was 27 percent among pregnant women 15-49 years, 21 percent among adolescent girls 10-19 years, 20 percent among non-pregnant women 15-49 years, 19 percent among children 6-59 months and 11 percent among adolescent boys 10-19 years. Iron deficiency measured by ferritin and corrected for inflammation was 28 percent among children 6-59 months, 19 percent among non-pregnant women 15-49 years, 18 percent among adolescent girls 10-19 years, 14 percent among pregnant women 15-49 years and five percent among adolescent boys 10-19 years. Iron deficiency anemia assessed by low hemoglobin and low ferritin was 11 percent among children 6-59 months, eight percent among non-pregnant women 15-49 years, seven percent among adolescent girls 10-19 years, five percent among pregnant women 15-49 years and one percent among adolescent boys 10-19 years.

## Modified Relative Dose Response (MRDR) and Vitamin A Status and Vision Problem During Pregnancy

MRDR measures vitamin A liver store. MRDR was measured in a randomly selected subsample of children 6-59 months and non-pregnant women 15-49 years. A total of four percent of children 6-59 months and three percent of non-pregnant women 15-49 years were vitamin A deficient with a $\mathrm{MRDR} \geq 0.060$.

Among those who gave birth in the last five years, a total of nine percent of women reported vision problems either during the day or night during their last pregnancy. Further, three percent reported problems with their vision at night only, and did not have difficulty with their vision during the daytime.

## Zinc Status

Zinc status was assessed among children 6-59 months and non-pregnant women 15-49 years. Serum zinc was inflammation corrected among children 6-59 months but not women 15-49 years. The prevalence was 21 percent among children 6-59 months and 24 percent among nonpregnant women 15-49 years. Zinc deficiency among both groups meets the criteria of a public health problem (greater than 20 percent) in the country. Zinc deficiency was more prevalent among children 6-59 months in rural areas.

## Red Blood Cell (RBC) Folate Status

RBC folate status was assessed among children 6-59 months, adolescent girls 10-19 years and non-pregnant women 15-49 years. Among children 6-59 months only one percent suffered from folate deficiency using macrocytic anemia as a hematological indicator relative to six percent among adolescent girls and five percent among non-pregnant women. The prevalence of risk of RBC folate deficiency was 16 percent among adolescent girls and 12 percent among nonpregnant women.

The prevalence of RBC folate insufficiency to prevent neural tube defects was high in both adolescent girls 10-19 years and non-pregnant women 15-49 years where more than nine in ten (96 percent adolescent girls 10-19 years and 90 percent non-pregnant women 15-49 years) suffered from folate insufficiency.

## Urinary lodine Status

Urinary iodine concentration was measured in children 6-9 years and women 15-49 years. The median urinary iodine concentration among children $6-9$ years was $314.1 \mu \mathrm{~g} / \mathrm{L}$. The median
urinary iodine concentration among non-pregnant women 15-49 years was $286.2 \mu \mathrm{~g} / \mathrm{L}$ and among pregnant women 15-49 years was $241.3 \mu \mathrm{~g} / \mathrm{L}$.

## Household Use and Purchase of Salt and Household Salt lodization

Approximately nine in ten households (88 percent) used refined salt, 12 percent used crystal salt and four percent used crushed salt for cooking. Among the households who used crystal salt nearly half (46 percent) reported washing the salt.

Among all salt samples, over nine in ten (91 percent) had iodine levels more than 15 ppm while four percent did not had any iodine ( $<5 \mathrm{ppm}$ ). Over two in ten ( 23 percent) had adequate iodine levels (15-40 ppm) while 68 percent had excessive iodine levels ( $>40 \mathrm{ppm}$ ).

Forty-six percent of crystal salt samples, 97 percent of refined salt samples and 98 percent of crushed salt samples had iodine levels of more than 15 ppm while around a quarter of crystal salt and one percent of refined salt did not have any iodine. Eight percent of crystal salt, 76 percent of refined salt and 52 percent of crushed salt had excessive iodine levels over 40 ppm .

## Household Use and Purchase of Wheat Flour and Iron Content in Wheat Flour Sample

Almost six in ten households grow wheat and locally mill the wheat, while 45 percent purchase Maida flour and 43 percent purchase Atta flour. Thirty-seven percent of fortifiable (purchased) wheat flour samples had iron levels meeting Nepal's standard for iron in wheat flour (i.e. $\geq 60$ $\mathrm{mg} / \mathrm{kg}$ ) with 13 percent of Maida and 36 percent Atta samples meeting the standard. The iron spot test result showed positive for 20 percent of purchased Maida and 36 percent of purchased Atta.

## Household Use of Fortifiable Food Vehicle

Almost all (95 percent) households reported consuming noodles and biscuits/cookies (96 percent). Among different types of oil consumed in the households, mustard oil (66 percent) was most frequently consumed followed by sunflower oil (24 percent) and soybean oil (nine percent). Half of the households reported using rice milled in small local mills, 13 percent use home pounded rice and six in ten used rice from commercial, large-scale mills

Prevalence of Various Indicators of Micronutrient Deficiencies by Population Group

| Population Group/Location | $\begin{array}{\|c} \text { Any Anemia } \\ \% \end{array}$ | $\begin{gathered} \text { Iron } \\ \text { Deficiency } \\ \% \end{gathered}$ | Iron <br> Deficiency <br> Anemia \% | Vitamin A Deficiency \% | Folate Deficiency $\%$ | Risk of Folate Deficiency $\%$ | RBC Folate Insufficiency for Preventing Neural Tube Defects \% | $\begin{array}{\|c\|} \hline \text { Zinc } \\ \text { Deficiency } \\ \% \end{array}$ | Median Urinary Iodine Concentration (UIC) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Hemoglobin ${ }^{\text {a }}$ | Ferritin ${ }^{\text {b }}$ | Hemoglobin ${ }^{\text {a }}$ \& Ferritin ${ }^{\text {b }}$ | MRDR ${ }^{\text {c }}$ | Red blood cell (RBC) folate ${ }^{\text {d }}$ | Red blood cell (RBC) folate ${ }^{\text {e }}$ | Red blood cell (RBC) folate ${ }^{\mathrm{f}}$ | Serum zinc ${ }^{8}$ | UIC ${ }^{\text {h }}$ |
| Children 6-59 months ( $\mathrm{N}=1,709$ ) |  |  |  |  |  |  |  |  |  |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 17.5 | 22.9 | 8.2 | 6.5 | 0.2 | 4.3 |  | 20.3 |  |
| Central | 21.4 | 30.1 | 12.7 | 7.0 | 0.4 | 6.9 |  | 20.7 |  |
| Western | 17.3 | 27.9 | 9.7 | 0.0 | 2.1 | 7.3 |  | 12.9 |  |
| Mid-western | 16.4 | 28.7 | 9.8 | 1.9 | 1.0 | 2.7 |  | 23.9 |  |
| Far-western | 21.0 | 25.8 | 10.5 | 0.0 | 2.7 | 6.4 |  | 30.3 |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 16.5 | 23.6 | 9.8 | 1.0 | 0.8 | 3.9 |  | 28.1 |  |
| Hill | 14.8 | 22.5 | 8.7 | 1.2 | 0.8 | 2.2 |  | 22.8 |  |
| Terai | 23.0 | 32.3 | 12.3 | 7.3 | 1.1 | 8.9 |  | 17.9 |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 22.6 | 34.0 | 16.9 | 1.9 | 0.7 | 4.5 |  | 11.5 |  |
| Rural | 18.6 | 26.6 | 9.7 | 4.6 | 1.0 | 5.9 |  | 22.0 |  |
| Total | 19.1 | 27.6 | 10.6 | 4.2 | 1.0 | 5.8 |  | 20.7 |  |


| Children 6-9 years ( $\mathrm{N}=1,138$ ) |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western |  |  |  |  |  |  | $\begin{aligned} & 299.0 \\ & 387.9 \\ & 357.7 \\ & 239.2 \\ & 238.5 \end{aligned}$ |
| Ecological Region Mountain Hill Terai |  |  |  |  |  |  | $\begin{aligned} & 238.5 \\ & 294.7 \\ & 368.9 \end{aligned}$ |
| Location <br> Urban <br> Rural |  |  |  |  |  |  | $\begin{aligned} & 341.8 \\ & 313.7 \\ & \hline \end{aligned}$ |
| Total |  |  |  |  |  |  | 314.1 |
| Non-Pregnant Adolescent girls 10-19 years ( $\mathrm{N}=1845$ ) |  |  |  |  |  |  |  |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 24.6 \\ & 22.5 \\ & 15.3 \\ & 16.6 \\ & 21.2 \end{aligned}$ | $\begin{aligned} & 13.5 \\ & 21.4 \\ & 19.4 \\ & 13.7 \\ & 19.8 \end{aligned}$ | $\begin{aligned} & 7.7 \\ & 7.3 \\ & 6.7 \\ & 5.6 \\ & 7.3 \end{aligned}$ | $\begin{gathered} 3.0 \\ 5.1 \\ 8.7 \\ 5.4 \\ 11.4 \end{gathered}$ | $\begin{array}{r} 8.5 \\ 14.4 \\ 22.7 \\ 15.5 \\ 25.7 \end{array}$ | $\begin{aligned} & 94.4 \\ & 96.1 \\ & 95.6 \\ & 95.8 \\ & 97.8 \end{aligned}$ |  |
| Ecological Region Mountain Hill Terai | $\begin{array}{r} 9.2 \\ 13.4 \\ 28.7 \end{array}$ | $\begin{aligned} & 19.9 \\ & 18.4 \\ & 17.3 \end{aligned}$ | $\begin{aligned} & 4.7 \\ & 5.2 \\ & 9.1 \end{aligned}$ | $\begin{aligned} & 6.0 \\ & 4.2 \\ & 7.9 \end{aligned}$ | $\begin{aligned} & 14.7 \\ & 12.2 \\ & 20.0 \end{aligned}$ | $\begin{aligned} & 96.4 \\ & 94.3 \\ & 97.0 \end{aligned}$ |  |
| $\begin{gathered} \text { Location } \\ \text { Urban } \\ \text { Rural } \\ \hline \end{gathered}$ | $\begin{array}{r} 22.3 \\ 20.3 \\ \hline \end{array}$ | $\begin{aligned} & 17.2 \\ & 18.1 \\ & \hline \end{aligned}$ | $\begin{array}{r} 7.6 \\ 7.0 \\ \hline \end{array}$ | $\begin{array}{r} 7.1 \\ 6.0 \\ \hline \end{array}$ | $\begin{aligned} & 17.9 \\ & 16.0 \\ & \hline \end{aligned}$ | $\begin{array}{r} 97.9 \\ 95.5 \\ \hline \end{array}$ |  |
| Total | 20.5 | 18.0 | 7.0 | 6.1 | 16.2 | 95.8 |  |



| Population Group/Location | $\begin{array}{\|c} \text { Any Anemia } \\ \% \end{array}$ | $\begin{array}{\|c} \text { Iron } \\ \text { Deficiency } \\ \% \end{array}$ | Iron Deficiency Anemia \% | Vitamin A Deficiency \% | Folate Deficiency $\%$ | Risk of Folate Deficiency \% | RBC Folate Insufficiency for Preventing Neural Tube Defects \% | $\begin{array}{\|c} \text { Zinc } \\ \text { Deficiency } \\ \% \end{array}$ | Median Urinary Iodine Concentration (UIC) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Hemoglobin ${ }^{\text {a }}$ | Ferritin ${ }^{\text {b }}$ | Hemoglobin ${ }^{\text {a }}$ \& Ferritin ${ }^{\text {b }}$ | MRDR ${ }^{\text {c }}$ | Red blood cell (RBC) folate ${ }^{\text {d }}$ | Red blood cell (RBC) folate ${ }^{\text {e }}$ | Red blood cell (RBC) folate ${ }^{\text {f }}$ | Serum zinc ${ }^{8}$ | UIC ${ }^{\text {h }}$ |
| Non-Pregnant Women 15-49 years ( $\mathrm{N}=2,144$ ) |  |  |  |  |  |  |  |  |  |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 27.4 \\ & 17.3 \\ & 19.0 \\ & 17.4 \\ & 22.8 \end{aligned}$ | $\begin{aligned} & 16.4 \\ & 20.3 \\ & 22.8 \\ & 13.8 \\ & 16.6 \end{aligned}$ | $\begin{aligned} & 7.3 \\ & 8.1 \\ & 9.2 \\ & 6.4 \\ & 7.0 \end{aligned}$ | $\begin{aligned} & 3.6 \\ & 3.9 \\ & 1.1 \\ & 2.2 \\ & 3.0 \end{aligned}$ | $\begin{aligned} & 1.8 \\ & 5.2 \\ & 3.6 \\ & 6.4 \\ & 8.0 \end{aligned}$ | $\begin{array}{r} 7.0 \\ 11.4 \\ 10.2 \\ 15.4 \\ 20.0 \end{array}$ | $\begin{aligned} & 87.3 \\ & 88.4 \\ & 88.9 \\ & 93.3 \\ & 95.9 \end{aligned}$ | $\begin{aligned} & 28.4 \\ & 21.6 \\ & 19.7 \\ & 26.5 \\ & 31.5 \end{aligned}$ | $\begin{aligned} & 309.0 \\ & 279.5 \\ & 300.9 \\ & 279.0 \\ & 217.7 \end{aligned}$ |
| Ecological Region Mountain Hill Terai | $\begin{aligned} & 11.1 \\ & 11.6 \\ & 29.1 \end{aligned}$ | $\begin{aligned} & 17.9 \\ & 18.5 \\ & 19.0 \end{aligned}$ | $\begin{aligned} & 4.6 \\ & 5.8 \\ & 9.9 \end{aligned}$ | $\begin{gathered} 0.0 \\ 0.8 \\ 5.2 \end{gathered}$ | $\begin{aligned} & 5.9 \\ & 2.9 \\ & 5.8 \end{aligned}$ | $\begin{array}{r} 12.4 \\ 8.0 \\ 14.4 \end{array}$ | $\begin{aligned} & 87.5 \\ & 86.5 \\ & 92.5 \end{aligned}$ | $\begin{aligned} & 28.5 \\ & 24.3 \\ & 23.9 \end{aligned}$ | $\begin{aligned} & 280.3 \\ & 241.1 \\ & 326.3 \end{aligned}$ |
| Location <br> Urban <br> Rural | $\begin{array}{r} 18.0 \\ 20.8 \\ \hline \end{array}$ | $\begin{aligned} & 22.2 \\ & 18.2 \end{aligned}$ | $\begin{aligned} & 8.0 \\ & 7.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & 4.2 \\ & 2.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & 2.7 \\ & 4.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & 11.0 \\ & 11.6 \\ & \hline \end{aligned}$ | $\begin{array}{r} 88.9 \\ 89.7 \\ \hline \end{array}$ | $\begin{array}{r} 20.0 \\ 25.0 \\ \hline \end{array}$ | $\begin{aligned} & 307.7 \\ & 279.4 \\ & \hline \end{aligned}$ |
| Total | 20.4 | 18.7 | 7.8 | 3.0 | 4.5 | 11.5 | 89.6 | 24.3 | 286.2 |
| Pregnant Women 15-49 years ( $\mathrm{N}=207$ ) |  |  |  |  |  |  |  |  |  |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 33.2 \\ & 26.6 \\ & 26.7 \\ & 15.0 \\ & 26.8 \end{aligned}$ | $\begin{aligned} & 14.4 \\ & 16.2 \\ & 12.4 \\ & 11.5 \\ & 12.7 \end{aligned}$ | $\begin{aligned} & 9.7 \\ & 2.4 \\ & 5.0 \\ & 2.9 \\ & 6.9 \end{aligned}$ |  |  |  |  |  | $\begin{aligned} & 284.6 \\ & 285.4 \\ & 239.7 \\ & 216.1 \\ & 133.6 \end{aligned}$ |
| Ecological Region Mountain Hill Terai | $\begin{array}{r} * \\ 15.6 \\ 36.4 \end{array}$ | $\begin{array}{r} * \\ 10.3 \\ 16.6 \end{array}$ | $\begin{aligned} & 2.9 \\ & 7.0 \end{aligned}$ |  |  |  |  |  | $\begin{array}{r} * \\ 242.1 \\ 230.5 \end{array}$ |
| Location <br> Urban <br> Rural | $*$ 27.7 | $\begin{aligned} & (5.1) \\ & 15.3 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0.0 \\ & 5.6 \\ & \hline \end{aligned}$ |  |  |  |  |  | $\begin{aligned} & 273.2 \\ & 239.7 \\ & \hline \end{aligned}$ |
| Total | 26.8 | 14.2 | 5.1 |  |  |  |  |  | 241.3 |

Note: N unweighted. All estimates account for weighting and complex sample design.
Sample sizes might vary slightly due to missing data. Sample sizes for pregnant women 15-49 years designed to be only nationally representative.
${ }^{\text {a }}$ WHO 2011. Adjusted for altitude; Non-pregnant women $15-49$ year $<12.0 \mathrm{~g} / \mathrm{dL}$, Pregnant women $15-49$ year $<11.0 \mathrm{~g} / \mathrm{dL}$, Men $\geq 15$ year $<13.0 \mathrm{~g} / \mathrm{dL}$, Children 12-14 year $<12.0 \mathrm{~g} / \mathrm{dL}$, Children $\geq 5-11$ year $<11.5 \mathrm{~g} / \mathrm{dL}$, Children $6-59$ month $<11.0 \mathrm{~g} / \mathrm{dL}$
${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001; Children $<5$ year $<12 \mu \mathrm{~g} / \mathrm{L}$, Children $\geq 5$ year and adults $<15 \mu \mathrm{~g} / \mathrm{L}$. BRINDA corrected for inflammation.
${ }^{\text {c }}$ Vitamin A deficiency by MRDR
${ }^{\text {d }}$ WHO 2015; Children 6-59 mo, Adolescent and Adult Women 10-49 year $<226.5 \mathrm{nmol} / \mathrm{L}$ (RBC folate deficiency using macrocytic anemia as a hematological indicator)
${ }^{\text {e}} \mathrm{WHO}$ 2012. Risk or difficiency defined as RBC folate $<305 \mathrm{nmol} / \mathrm{L}$
${ }^{\mathrm{f}}$ Adolescent and Adult Women 10-49 years $<906 \mathrm{nmol} / \mathrm{L}$ (RBC folate insufficiency for preventing neural tube defects anong women of reproductive age at the population level)
${ }^{\text {s }}$ IZiNCG 2007. For Children 6-59 mo, Zinc deficiency was defined as less than 65 or $57 \mu \mathrm{~g} / \mathrm{dL}$ depending on the time of day: Morning (until noon), non-fasting: $65 \mu \mathrm{~g} / \mathrm{dL}$; Afternoon, non-fasting: $57 \mu \mathrm{~g} / \mathrm{dL}$; for Non-Pregnant Women 15-49 y Zinc deficiency was defined as less than 66 or $59 \mu \mathrm{~g} / \mathrm{dL}$ depending on the time of day: Morning (until noon), non-fasting: $66 \mu \mathrm{~g} / \mathrm{dL}$; Afternoon, non-fasting: $59 \mu \mathrm{~g} / \mathrm{dL}$
${ }^{\text {h}}$ WHO, 2007; For Non-Pregnant Women15-49 year and Children 6-9 year UIC Median defined as Excess $\geq 300 \mu \mathrm{~g} / \mathrm{L}$, Above requirements $200-299 \mu \mathrm{~g} / \mathrm{L}$,
Sufficient 100-199 $\mu \mathrm{g} / \mathrm{L}$, Mild deficiency 50-99 $\mu \mathrm{g} / \mathrm{L}$, Moderate deficiency 20-49 $\mu \mathrm{g} / \mathrm{L}$, Severe deficiency<20 $\mu \mathrm{g} / \mathrm{L}$; For Pregnant Women 15-49 year UIC defined as Excess $\geq 500 \mu \mathrm{~g} / \mathrm{L}$, Above requirements $250-499 \mu \mathrm{~g} / \mathrm{L}$, Adequate $150-249 \mu \mathrm{~g} / \mathrm{L}$, Insufficient $<150 \mu \mathrm{~g} / \mathrm{L}$;

## Introduction

### 1.1 Earlier Studies on Micronutrient Status in Nepal

Nepal Micronutrient Status Survey (NMSS) - 1998, the last survey of this nature in Nepal prior to the current Nepal National Micronutrient Status Survey (NNMSS)-2016, highlighted malnutrition as a major public health concern (MoH, 1998). NMSS-1998 in particular assessed anemia, clinical and sub-clinical indicators of vitamin A status among women (15-49 years) and young children (6-59 months), and urinary iodine (UI) among women (15-49 years) and children (6-11 years). It reported protein energy malnutrition (PEM), vitamin A deficiency (VAD), iodine deficiency disorders (IDD) and anemia as the most significant nutritional disorders among the Nepalese population. These data, however, are out of date now and cannot be used for programmatic decision making.

The Nepal Iodine Deficiency Disorders Status Survey (NIDDSS) - 2005 also assessed national estimates of urinary iodine concentrations (UIC) among children 6-11 years (MoHP, 2005). In order to maintain effective policies and programs, a continued monitoring of the iodine status as well as salt iodization levels among priority populations, including the status of pregnant and reproductive aged women, is needed. There has never been any nationally representative data collected on the status of iron, folic acid, and zinc, nor any analysis of the etiology of anemia among vulnerable populations. Although the Nepal Demographic Health Survey (NDHS) measures hemoglobin through capillary blood to assess status of anemia, it does not collect data on other factors that contribute to anemia including other micronutrient deficiencies such as folic acid, zinc, and vitamins A; infections such as malaria, soil transmitted helminthes (STH), Helicobacter pylori (H. pylori), and Visceral leishmaniasis (Kala-azar); and blood disorders such as thalassemias, sickle cell, hemoglobin E and glucose 6 phosphate dehydrogenase (G6PD) (MoH, 2017). The NNMSS-2016, a survey led by Ministry of Health (MoH) and New ERA with support from USAID, UNICEF Nepal, US Centers for Disease Control and Prevention (CDC) Atlanta, collected data on micronutrient status and these various potential causes of anemia in order to better understand the etiology of anemia in Nepal. The aim of the NNMSS is to collect data to inform key nutrition policies and programs in the country.

### 1.2 Overview of the Micronutrient Deficiencies in Nepal

## Anemia and Iron Status

Anemia is a medical condition in which the red blood cell count or hemoglobin is less than normal. Over 30 percent of the world's population, and about 40 percent of preschool children and 50 percent of pregnant women in developing countries are anemic (WHO http://www.who.int/nutrition/ topics/ida/en/). Iron deficiency is a major cause of anemia, which is exacerbated by infectious diseases such as malaria, HIV/AIDS, hookworm infestation, schistosomiasis, and tuberculosis (WHO - http://www.who.int/nutrition/ topics/ida/en/).

The burden of anemia and malnutrition is high in Nepal. In 2016, Nepal Demographic and Health Survey shows that 53 percent of the children under 5 years of age suffered from anemia, 36 percent suffered from stunting, 27 percent underweight, and 10 percent wasting. The prevalence of anemia was higher among younger children ( 69 percent among children 6-23 months) and the distribution varied by ecological zones and rural/urban residence. Among children 6-59 months, 60 percent had anemia in the Terai, 40 percent in the Hill, 57 percent in the Mountain, 49 percent in the urban areas, and 56 percent in the rural areas. The burden was high at 41 percent even among children in the highest socio-economic quintile. Among children 12-59 months who received deworming tablets in the last six months, anemia prevalence was 45 percent and it was 57 percent among those who had not received deworming tablets. Among women 15-49 years of age, 41 percent had anemia. The prevalence of anemia was 43 percent in rural areas and 40 percent in urban areas. By eco-zone, the prevalence was highest among women 15-49 years in the Terai ( 52 percent) compared to Mountainous regions ( 35 percent) or the Hill (29 percent) (MoH, 2017).

In Nepal, there have been no nationally representative data on iron status for women or children. Although there is no information on the causes of anemia among priority populations, it is expected that iron deficiency is an important cause of anemia. Despite programs such as iron supplementation and deworming, there has been little change in anemia status in Nepal over the last decade.

As mentioned earlier, many medical conditions/disorders and infections can cause anemia. Nepal has malaria transmission of both Plasmodium falciparum and Plasmodium vivax, mostly in the Terai. The 2009 WHO World Malaria Report stated that Nepal had shown sustained decreases in malaria infection between 2000 and 2008 despite only implementing small scale preventive interventions that reach less than 50 percent of the populations at high risk (WHO 2009). STH are prevalent in Nepal, but there are no national level prevalence data available. Earlier studies suggested that more than 50 percent of children and adolescents in Nepal have intestinal worms (MoHP, 2008). The visceral leishmaniasis "Kala-Azar Elimination Program" started in 2005 with the goal of limiting the incidence of Kala-Azar infection to $1 / 10,000$ at the district level by 2015 (MoHP, 2014). Multiple blood disorders have been identified among populations in Nepal including $\alpha$ thalessemia, $\beta$ thalessemia, sickle cell, hemoglobin E, and G6PD. Blood disorder distribution varies by ethnicity and geography in Nepal, and most studies have been small scale and have not provided national estimates of blood disorders for the country. Genetic testing for blood disorders can be assessed using either enzyme-linked immunosorbent assay (ELISA) or DNA (deoxyribonucleic acid) testing using high-perforance liquid-chromatography (HPLC) or gel electrophoresis (Tatfeng et.al., 2012; Panigrahi et.al., 2015). For example, both trait and disease for blood disorders will be assessed (e.g., sickle cell trait [HbAS] and sickle cell disease [HbSS]) for the survey. ELISA is less more feasible and
less expensive in comparison to DNA genetic testing; however, ELISA cannot distinguish between species of blood disorders like DNA genetic testing can.

## Vitamin A Deficiency and Night Blindness

Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. In pregnant women VAD causes night blindness and may increase the risk of maternal mortality. It is a public health problem in more than half of all countries, especially in Africa and South-East Asia, Young children and pregnant women in low-income countries are the most affected by VAD. An estimated 250 million preschool children are vitamin A deficient, and an estimated 250,000 to 500,000 vitamin A-deficient children become blind every year, half of them dying within 12 months of losing their sight (WHO - http://www.who.int/nutrition/topics/vad/en/). Populations from South Asian developing countries are vulnerable to VAD.

NMSS-1998 assessed clinical (night blindness) and biochemical (serum retinol) indicators of vitamin A status among women 15-49 years and children 6-59 months. Among mothers of children 6-59 months of age, five percent reported current night blindness, six percent among pregnant and five percent among non-pregnant women 15-49 years. In rural areas, the prevalence of current night blindness was five percent and among urban areas it was one percent. By eco-zone, the prevalence was six percent among women15-49 years in the Terai, four percent in the Hill, and five percent in the Mountain. During the previous pregnancy, mothers' reported prevalence of night blindness was 17 percent ( 18 percent in rural areas, six percent in urban areas, 19 percent in the Terai, 13 percent in the Hill, and 20 percent in the Mountain) (MoH, 1998).

## Iodine Status

Iodine is an essential nutrient and is needed for the production of thyroid hormone. Iodine deficiency disorders (IDD) can lead to enlargement of the thyroid, hypothyroidism (resulting into slow metabolism), and to mental retardation in infants and children whose mothers were iodine deficient during pregnancy. Serious iodine deficiency during pregnancy can result in stillbirth, spontaneous abortion, and congenital abnormalities. The number of countries where iodine deficiency is a public health problem has halved over the past decade, yet 54 countries, mostly from Africa and Asia, are still iodine-deficient (WHO http://www.who.int/nutrition/topics/idd/en/). NIDDSS-2005 assessed iodine status measuring UIC among children 6-11 years in a household survey. The median UIC was $188 \mu \mathrm{~g} / \mathrm{l}$ among children nationally, $169 \mu \mathrm{~g} / \mathrm{l}$ among children in rural areas and $361 \mu \mathrm{~g} / \mathrm{l}$ among children in urban areas. It indicated iodine sufficiency overall and among rural children, and excess iodine intake among urban children (MoHP, 2005).

## Status of Other Micronutrients

Several studies have reported the prevalence of micronutrient deficiencies in non-nationally representative samples of women and children in Nepal. From these reports and dietary patterns in Nepal, it is expected that micronutrient deficiencies are common, particularly for Zinc (necessary for normal growth, enhancing immune system and reducing morbidity from diarrhea and pneumonia) and folatefolate (B vitamin necessary to prevent and treat several conditions including anemia caused by folate deficiency and to prevent neural tube defects that can develop during pregnancy).

## Inflammation

Preliminary unpublished data from the baseline evaluation survey for the Infant and Young Child Feeding (IYCF) and Micronutrient Powders (MNP) programs conducted in 2012 showed that the prevalence of inflammation was approximately 43 percent among children 6-23 months. No national data on inflammation in Nepal are available, but the prevalence is likely high. Many indicators of micronutrient status are influenced by the inflammatory process. In the presence of inflammation, retinol and RBP levels usually decrease so that the prevalence of Vitamin A deficiency is overestimated (Suchdev et. al., 2016) No indicators of inflammation were assessed and accounted for in describing the prevalence of vitamin A deficiency in the NMSS-1998. Serum zinc concentration is also often reduced in the presence of inflammation. Iron status indicators, including ferritin, are also affected by the inflammatory process, which usually elevates ferritin values resulting in an underestimation of the prevalence of iron deficiency (Suchdev et.al., 2016). Collection of the inflammatory markers is therefore vital to adjust for the influence of inflammation on selected biomarkers to correctly interpret these micronutrient indicators.

## Infant and Young Child Feeding Practices

Poor feeding practices contribute to high rates of malnutrition in Nepal. The World Health Organization (WHO) recommends breastfeeding exclusively (breast milk only, with no other solids or liquids including water) for six months, and then introducing complementary foods at six months, while continuing breastfeeding for at least two years (WHO, 2001). In Nepal, over 98 percent of children initiate breastfeeding and 66 percent of children under age 6 months are exclusively breastfed. Among children 6-8 months of age, 84 percent were receiving some solid or semi-solid food. Among children 6-23 months, 47 percent were given foods from the recommended number of food groups, and 71 percent were fed an appropriate number of times per day. Overall 36 percent of children 6-23 months in Nepal were meeting the minimum acceptable diet (MoH, 2017).

### 1.3 Nutrition Interventions in the Country

In Nepal, MoHP has implemented multiple strategies to improve the nutritional status of people, with a special emphasis on vulnerable populations including young children and pregnant women. In 1993, the national vitamin A supplementation program began distributing high dose vitamin A capsules to children 6-59 months of age twice a year. This program has consistently achieved coverage of 80-90 percent of targeted children every six months (MoHP, 2012 and $\mathrm{MoH}, 2017$ ). Children 12-59 months also receive deworming medications for STH during vitamin A distributions and the coverage for deworming tablets during the previous six months in the NDHS 2016 was 76 percent. Postpartum vitamin A supplementation among mothers had coverage of 40 percent (MoHP, 2012). Recently efforts have focused on improving children's access to zinc in management of diarrhea.

In 2002 the MoHP developed the National Strategy for the Control of Anemia among Women and Children. In order to prevent anemia and iron deficiency, the strategy distributes iron and folic acid supplements to pregnant women starting at the beginning of the second trimester of pregnancy and continuing until 45 days postpartum ( $\mathrm{MoH}, 2002$ ). The coverage was 90 percent in 2016, which reflects an important increase from 80 percent in 2011, 59 percent in 2006 and 23 percent in 2001 (MoHP, 2012; MoHP, 2007 and MoH, 2002). However, intake adherence was relatively low with only 42 percent of women reporting intake of the tablets for a minimum
of 180 days. The MoHP has initiated deworming programs for all pregnant women during the first trimester of pregnancy and the coverage was 69 percent in 2016 (MoH, 2017).

Interventions to improve infant and young child feeding (IYCF) includes the support of optimal breastfeeding and complementary feeding practices among children 0-23 months of age. The MoHP piloted an integrated IYCF program including distribution of MNP to children 6-23 months of age in six districts. The program was then scaled up in nine additional districts with a plan for national scale up. These MNPs, locally branded as "Baal Vita", contains multiple micronutrients, including iron, folic acid, zinc, iodine, copper, selenium, and vitamins $\mathrm{A}, \mathrm{C}, \mathrm{D}$, $E, B_{1}, B_{2}, B_{3}, B_{6}$, and $B_{12}$. As of today, the MNP program is in 23 districts. After a major earthquake in 2015, MNP Baal Vita distribution was also initiated for children aged 6-59 months as part of emergency response in 14 earthquake affected districts, including Gorkha, Makawanpur, Rasuwa, Okhaldhunga, Kathmandu, Bhaktapur, Lalitpur, Kavrepalanchwork, Sindhupalchowk, Dolakha, Ramechhap, Sindhuli, Dhading and Nuwakot.

Almost all salt is imported to Nepal from India with a small amount entering from other neighboring countries (MoHP, 2005). Universal salt iodization (USI) was initiated in 1973 and the Salt Trading Corporation is authorized by the government to import and distribute iodized salt nationally for controlling IDD. The Nepal government requires that salt be iodized at a minimum of 50 ppm of iodine ( 85 ppm of potassium iodate) at the factory, with an expectation that the salt will retain at least a level of 30 ppm of iodine at the retail level and 15 ppm at the household level (MoHP et al. 2005). Nepal is working to achieve and maintain $\geq 90$ percent of households consuming adequately iodized salt (>15ppm) through the implementation of a communication campaign supporting the purchase and use of iodized salt packages with the two-child logo and limiting the importation of non or inadequately iodized salt. Iodized salt (based on the rapid test kit) was present in 77 percent of households in 2006, 80 percent of households in 2011 and 95 percent of households in 2016 (MoHP, 2007; MoHP, 2012; and $\mathrm{MoH}, 2017$ ). There are three main categories of salt types (crystal, crushed and refined) with most families using large crystal salt (Phoda) or refined salt (Aayo). Phoda is much less likely to be adequately iodized (33 percent adequate) compared to Aayo (99 percent adequate) (MoHP, 2005). Preference for salt type varies by eco-zone, socio-economic status, literacy and other characteristics.

In Nepal, the main products after grinding wheat flour are coarse flour (Suji), fine flour (Maida), flour (Atta), and bran (Chokar). There are two basic systems of milling wheat flour including more than 20 large roller mills, and approximately 25,000 small "Chakki" mills and water powered mills, which are especially common in the rural areas. Fortification of wheat flour with iron ( 60 mg of elemental iron powders $/ \mathrm{kg}$ ), folic acid ( $1.5 \mathrm{mg} / \mathrm{kg}$ ) and vitamin A (1 $\mathrm{mg} / \mathrm{kg}$ ) was done on a voluntary basis in large roller mills until it became mandatory in 2011. Voluntary fortification at smaller water mills has also been occurring in some village development committees (VDCs) of Lalitpur district. A survey by the Micronutrient Initiative in the year 2000 found that wheat flour products from roller mills were consumed by 30 percent of the Nepalese population ( 50 percent urban; 22 percent rural).

Vegetable ghee (clarified butter) in Nepal is fortified with vitamin A ( $\geq 25 \mathrm{IU} / \mathrm{g}$ ), while animal ghee is not fortified. Both vegetable ghee and vegetable oil have been distributed by the World Food Program (WFP) in food insecure areas, predominantly in the mid-west and far-west. According to WFP standards, when these products are distributed, they must be fortified with both vitamin A. The ghee and vegetable oil distributed by WFP are typically produced in Nepal. Specific data are not available, but nutrition stakeholders generally perceive that consumption of vegetable ghee is decreasing in favor of vegetable oil.

The Department of Food Technology and Quality Control (DFTQC) of the Ministry of Agricultural Development is responsible for the regulatory monitoring of fortified foods for quality and safety. They carry out monitoring at the factory and retail levels, and regularly analyze food samples. They have five regional offices around the country, including the central office in Kathmandu.

The following list provides the national nutrition programs that exist in Nepal under the framework of Multi Sector Nutrition Plan (MSNP)

## Nutrition Specific Programs

## 1. Protein Energy Malnutrition Control Program

a. Maternal, Infant and Young Child Nutrition Program (MIYCN)
i. Growth monitoring and promotion (GMP)
ii. Breastfeeding protection and promotion program
iii. Community promotion of IYCF
iv. Integrated management of acute malnutrition (IMAM) program.
v. Super flour distribution in Karnali districts
vi. Child cash grant in Karnali districts
2. Iron Deficiency Anemia Control Program
a. Iron Folic Acid (IFA) supplementation program to pregnant and lactating women
b. Weekly IFA supplementation program to adolescent girls 10-19 years
c. Multi MNP distribution program to children 6-23 months
d. Fortified flour promotion program
3. Deworming
a. Deworming program for children 12-59 months
b. Deworming program for children 6-11 years
c. Deworming program for pregnant women
4. Iodine Deficiency Disorder Elimination Program
a. Universal salt iodization program
b. Iodized salt social marketing campaign to promote iodized salt with Government Certified "Two Child Logo" with adequate iodine content (>=15 ppm)
5. Vitamin A Deficiency Disorder Control Program
a. Biannual Vitamin A distribution program to children 6-59 months
b. Vitamin A treatment for severe malnutrition (SAM), measles, chronic diarrhea and clinical cases related to Vitamin A deficiency (night blindness, Bitot’s spot and Keratomalacia)
6. Other integrated nutrition intervention focusing on stunting reduction:
a. Suaahara integrated nutrition program (Focus area: essential nutrition including maternal and infant and young child nutrition plus water sanitation and hygiene, homestead food production, Maternal and Child Health and Family Planning)
b. Golden 1000 days Program (Focus Area: IYCF promotion)
c. Zinc in the management of diarrhea
7. Other specific intervention focusing on emergency:
a. Emergency preparedness and response program.

## Nutrition Sensitive Programs

a. Knowledge-based integrated sustainable agriculture and nutrition (KISAN) Project (focus area: food security and value chain)
b. Feed for Peace Program (focus area: maternal and child nutrition and livelihood)
c. Hand washing with soap promotion program
d. Open defecation free (ODF) campaign
e. Early childhood development (ECD) program
f. Improvised stove promotion to control indoor pollution
g. School health and nutrition Program

### 1.4 Rationale for NNMSS

NNMSS-2016 collected nationally representative data on the micronutrient status of key population groups in Nepal. The survey is comprehensive and provides updated or new information not previously available. In addition, data were collected to allow for a later analysis of the etiology of anemia among young children and non-pregnant women 15-49 years. NNMSS-2016 findings will fill important data gaps and the data collected in this survey can be used for decision making related to key nutrition programs in the country and effective integration of public health interventions. Some of the programmatic needs that will be met by this survey include:

- Understanding the etiology of anemia, including deficiency of iron and other micronutrients, malaria, blood disorders, STH, Kala-Azar and H. pylori among key populations and determining whether adjunct interventions need to be added or strengthened in order to address the public health problem of anemia in Nepal.
- Assessing iron and folic acid status of women 15-49 years, adolescent girls 10-19 years, and children 6-59 months in order to provide nationally representative data on the prevalence of these deficiencies for the first time, as well as a baseline for adolescent girls prior to implementing a national iron and folic acid supplementation intervention for this group.
- Examining the effectiveness of the biannual vitamin A program at preventing vitamin A deficiency among children 6-59 months.
- Providing a baseline for multiple micronutrients in young children prior to the additional scale up of the integrated infant and young child feeding and Baal Vita (micronutrient powders) program.
- Examining the UIC levels of key population groups and the quality of the salt iodization program, in order to adjust the level of iodization of salt or use of iodized salt in different food products as needed.
- Understanding what percentages of households consume wheat flour that is fortified with iron.


### 1.5 Specific Objectives of the Survey

The NNMSS-2016 assesses micronutrient status among representative populations in Nepal, including specifically the status of vitamins A, iron, folate, iodine, zinc and the condition of anemia among vulnerable populations in the country. To assess nutritional status and understand factors related to micronutrient status and anemia, the survey also collected information on anthropometry, infectious diseases (malaria, STH, H. pylori, and Visceral Leishmaniasis (Kala-Azar), blood disorders, and markers of inflammation. Additionally, the survey provides information on priority process and outcome indicators for national supplementation and fortification interventions, and other key nutrition interventions in the country. The specific objectives of the survey are:

- Among women 15-49 years, assess the magnitude and the distribution of anemia; deficiencies in vitamins A, iron, folate, zinc, and iodine; infectious diseases (malaria, STH, H. pylori, Kala-Azar); blood disorders; inflammation; and anthropometry. The data will be representative of non-pregnant women 15-49 years and provide nationally representative estimates among a small group of pregnant women 15-49 years.
- Among adolescent girls 10-19 years, assess the magnitude and distribution of anemia; deficiencies in vitamin A, iron, and folate; malaria infection; H. pylori; inflammation; and anthropometry.
- Among adolescent boys 10-19 years, assess the magnitude and the distribution of the condition of anemia; deficiencies in vitamin A and iron; malaria infection; H. pylori; and inflammation.
- Among children 6-9 years, assess iodine status.
- Among children 6-59 months, assess the magnitude and distribution of anemia; deficiencies in vitamins A, iron, zinc, and folate; infectious diseases (malaria, STH, H. pylori, and Kala-Azar); blood disorders; inflammation; and anthropometry.
- Examine the etiology of anemia among non-pregnant women 15-49 years and children 659 months.
- Collect household use and purchasing patterns of fortifiable wheat flour and other selected fortifiable foods.
- Assess coverage and adherence for key national micronutrient and nutrition interventions.


## C H A P TER 2

## Methodology

### 2.1 Background of the Country

Surrounded by two large countries - China to the North and India to the other three sides, Nepal is a landlocked country with a total area of 147,181 square kilometers, inhabited by an estimated population of about 28.7 million $^{1}$ in 2017. It stretches 885 kilometers east to west and 193 kilometers north to south on the average. Because of the rugged topography with elevations ranging from 60 meters in the south to 8,848 meters (the peak of Mount Everest) in the north, Nepal is customarily divided into three ecological belts: Mountain in the north, Terai (plains) in the south, and the Hill in between. Despite covering about 35 percent of the total area, only seven percent of the population lives in the Mountain ecozone due to the harsh terrain and severe climate. In contrast, the Hill (covering about 42 percent area) and the Terai (covering about 23 percent area) support about 43 percent and 50 percent of the total population respectively. With tropical and subtropical climates, the Terai is the most fertile land area of Nepal, and has relatively better road facilities due to its plain terrain. The Hill ecozone, which includes the capital city Kathmandu, has climatic conditions ranging from temperate to cold and even sub-arctic at some places, while the Mountain has a largely arctic climate. The roads and other facilities in the Hill ecozone are better than those found in the Mountain ecozone, where there is limited infrastructure and extreme conditions.

For decades, Nepal was divided into five development regions for administrative purposes: Eastern, Central, Western, Mid-western, and Far-western development regions. The country was also divided into 14 zones, 75 districts and smaller administrative units called municipalities (some of which are categorized into metropolitan or sub-metropolitan cities) or village development committees (VDCs), which are further divided into a number of wards. However, Nepal was recently restructured into seven provinces and 753 local body systems (new municipalities/VDCs) in the context of the federal structure the nation acquired as per the newly promulgated Constitution of Nepal, 2015. As the new system is yet to take a definitive form, the survey was designed based on the earlier administrative divisions, and the analyses are presented by the three eco-zones and five development regions.

[^1]

### 2.2 Sampling Design

The study used a stratified multi-stage cluster sampling method. The entire nation was first divided into 15 strata: by five development regions (Eastern, Central, Western, Mid-western and Far-western) and three ecological zones (Terai, Hill and Mountain). The 2011 census was used to select the sample. Clusters (wards in the urban and rural areas) were used as the primary sampling units (PSUs). The minimum cluster size was defined as 100 households, and if necessary, clusters were combined prior to the first stage of sampling to meet this number.

In the first-stage of sampling, six clusters from each stratum in the Mountain ecozone, and 15 clusters from each stratum in the Hill and Terai ecozone were selected using probability proportional to size (PPS) by cluster population size (Table 2.1). Because the majority of the population lives in the Terai ( 50 percent) and Hill (43 percent), whereas only seven percent resides in the Mountain, the stratification by eco-zone was done to ensure reasonable estimates for the Mountain ecozone. Altogether, 180 clusters were selected which included a total of 30 from the Mountain; 75 each from the Hill and Terai; as well as a total of 36 from each development region (Table 2.1).

Table 2.1: Distribution of Clusters across Ecological and Development Regions, Nepal National Micronutrient Status Survey, 2016

| Ecological Regions | Development Regions |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |
|  | Eastern | Central | Western | Mid-western | Far-western |  |
| Mountain | 6 | 6 | 6 | 6 | 6 | 30 |
| Hill | 15 | 15 | 15 | 15 | 15 | 75 |
| Terai | 15 | 15 | 15 | 15 | 15 | 75 |
|  | Total | $\mathbf{3 6}$ | $\mathbf{3 6}$ | $\mathbf{3 6}$ | $\mathbf{3 6}$ | $\mathbf{3 6}$ |

After the clusters were selected, any clusters which were too large (e.g., with more than 300 households) were further divided into segments of approximately 100 households each in the next stage. The decision to further divide any large clusters into segments were done by data collection team at the time of household listing. One segment was randomly drawn as the selected cluster-segment by the team members. A total of 54 out of the 180 selected clusters were segmented.

In the next stage, maps of the selected clusters were created with the help of the ward office(s) and key informants a few days prior to data collection. All households on the map were numbered for each cluster. A total of 24 households were then selected from the list using a systematic sampling method and invited to participate in the survey. The systematic sampling method included dividing, the total number of households in the cluster by 24 to determine the
sampling interval. The first household was randomly chosen within the first interval, e.g. a cluster consists of 96 households which was divided by 24 to get 4 as the interval. Again the numbers from 1 to 4 was written in a piece of paper, put inside a hat and again one number was randomly selected. Whichever number was selected, that number was treated as the first household for that cluster and the remaining 23 households were then selected systematically using the sampling interval. This resulted in a total of 4,320 households ( 180 clusters $\times 24$ households) selected and invited to participate. As the Table 2.2 in the next section shows, the desired sample size of children 6 - 59 months was 2130 or $11.8 \sim 12$ children per cluster. The choice of 24 households was based on the assumption that an eligible child aged 6-59 months would be found in half or 2160 (i.e. $4320 \div 2$ ) of the households (or $2160 \div 180=12$ children per cluster).

The selection of the clusters and the households was followed by listing all of the eligible individuals from the 24 households in each cluster who belong to the survey population groups (children 6-59 months; children 6-9 years; adolescent girls 10-19 years; adolescent boys 10-19 years; non-pregnant women 15-49 years; and pregnant women 15-49 years). These lists were consolidated for each population group in the cluster and all pregnant women 15-49 years were invited to participate. Then the required numbers of individuals needed for the other five population groups ( $12,7,12,6$, and 12 , respectively) were then selected randomly from the list (sample size calculations for each population group are described below). This could possibly include more than one participant from the same household for any given population group. If an adolescent girl 15-19 years was randomly selected from the list of adolescent girls 10-19 years, and was also randomly selected from the list of non-pregnant women 15-49 years, then she was put in the latter (15-49 years) category for the interview and biological data collection. This was because the woman 15-49 years data collection was more comprehensive and included all of the same indicators collected for adolescent girls 10-19 years. Her relevant data was then included in the analysis for adolescent girls 10-19 years, as well as for women 15-49 years.

There was no replacement of clusters, households, or population group participants regardless of the cause (such as clusters inaccessible due to natural disaster, refusal to participate, or less than the expected number of participants per cluster, for example). In case the lists contained fewer or exactly the same number of individuals from a given cluster as required for the study, all of the listed individuals were selected and invited to participate. The individuals thus selected from all of the clusters from all strata throughout the nation together formed the national level sample for the given population group.

### 2.3 Desired Sample Size Estimation

### 2.3.1 Sample Size for Key Micronutrient Indicators (Anemia, and Iron Deficiency)

The desired sample sizes were computed for key micronutrient indicators (anemia, and iron deficiency) for each population group using the following formula-

$$
\mathrm{n}=\mathrm{Z}_{\alpha / 2}{ }^{2 *} \mathrm{p}^{*}(1-\mathrm{p}) / \mathrm{ME}^{2} \text {, where }
$$

$\mathrm{Z}_{\alpha / 2}$ is the critical value of the normal distribution at $\alpha / 2$ (1.96 for a confidence level of 95 percent where $\alpha$ is 0.05 ), ME is the margin of error, p is the assumed sample proportion
(population size is assumed to be infinite), and n is the minimum sample size required per domain.

The assumed design effect was two, or as informed by data from the 2011 NDHS for anemia, and unpublished preliminary data for ferritin and inflammation from the IYCF/MNP baseline evaluation survey. The assumed household response rate was 95 percent. The assumed individual response rate for collection of venous blood samples and urine were 90 percent for these indicators. The sample size for pregnant women was assumed to be five percent of all women based on NDHS 2011 data.

Inflammation influences the interpretation of ferritin and soluble transferrin receptor (sTfR) (iron status indicators), and serum zinc. This survey collected indicators of inflammation (( $\alpha$ Acid Glycoprotein (AGP) and C-Reactive Protein (CRP)) to help in the interpretation of these data. Sample sizes were increased to account for an assumed prevalence of inflammation of 40 percent. This estimate was based on data from an impact survey conducted in two districts (one Hill and one Terai eco-zones) as part of the evaluation for the IYCF/MNP project. The prevalence of inflammation (elevated AGP and/or elevated CRP) in both of these districts was $\sim 43$ percent among children $6-23$ months. UI and anemia are not influenced by inflammation so the sample sizes for these indicators did not account for inflammation.

The Table 2.2 describes the estimation of the desired sample sizes for each of the population groups for the analysis of anemia and iron deficiency.

Table 2.2: Estimation of the Desired Sample Sizes for the Population Groups for Anemia, Iron Deficiency, and lodine, Nepal National Micronutrient Status Survey, 2016

| Population | Indicator | Estimated <br> Prevalence | ME | DE ${ }^{\text {a }}$ | $\mathrm{RR}^{\text {b }}$ | Sample Size/ Domain (I) | 40\% <br> Inflam. <br> Effect <br> (II) | Adjusted Sample Size/ Domain $\text { ( III = I + II })$ | Total Desired Sample Size $(\mathrm{IV}=\mathrm{III} * 6)$ | Sample Size/Cluster for Population Groups (V=IV/180) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Children (6-59 months) | Anemia ${ }^{\text {c }}$ | 0.46 | 0.09 | 2.25 | 0.9 | 295 | NA | 295 | 1770 | 11.8 ~ 12 |
|  | Iron def ${ }^{\text {d }}$ | 0.40 | 0.09 | 2 | 0.9 | 253 | 102 | 355 | 2130 |  |
| Children (6-9 years) | $\mathrm{UI}^{\mathrm{e}}$ | 0.27 | 0.09 | 2 | 0.9 | 208 | NA | 208 | 1248 | $6.9 \sim 7$ |
| Adolescent <br> Girls <br> (10-19 years) ${ }^{e}$ | Anemia ${ }^{\text {c }}$ | 0.39 | 0.09 | 2 | 0.9 | 251 | NA | 251 | 1506 | $11.8 \sim 12$ |
|  | Iron def ${ }^{\text {d }}$ | 0.40 | 0.09 | 2 | 0.9 | 253 | 102 | 355 | 2130 |  |
| Non-pregnant Women (15-49 years) | Anemia ${ }^{\text {c }}$ | 0.35 | 0.08 | 2 | 0.9 | 304 | NA | 304 | 1824 | 11.8 ~ 12 |
|  | Iron def ${ }^{\text {d }}$ | 0.40 | 0.09 | 2 | 0.9 | 253 | 102 | 355 | 2130 |  |
|  | UI ${ }^{\text {e }}$ | 0.44 | 0.08 | 2 | 0.9 | 329 | NA | 329 | 1974 |  |
| Adolescent <br> Boys <br> (10-19 years) | Anemia | 0.25 | 0.05 | 2 | 0.9 | 641 | NA | 641 | 641 | $5.3 \sim 6$ |
|  | Iron def | 0.15 | 0.04 | 2 | 0.9 | 681 | 273 | 954 | 954 |  |
| Pregnant Women (15-49 years) | Pregnant women assumed to be 5\% of all women found in households <br> (NDHS 2011) |  |  |  |  |  |  |  | 107 |  |

${ }^{\text {a }}$ DE $=$ Design Effect (based on NDHS 2011 for Anemia; and on IYCF/MNP Project Baseline Survey for Ferritin and RBP for children 6-59 months)
${ }^{\mathrm{b}} \mathrm{RR}=$ Assumed individual response rate
${ }^{\text {c }}$ NDHS 2011 data not available for adolescent girls 10-19 year so data for girls 15-19 year used as proxy
${ }^{\text {d }}$ Ferritin data for children 6-23 months from the 2013 IYCF/MNP project baseline survey used to estimate the prevalence of iron deficiency for children 6-59 months. For the Eastern, Western, and Central development regions, the estimates for children 6-59 months for iron deficiency were slightly less precise (e.g., $\sim+/-9.5$ percent) due to the expected smaller number of eligible children per cluster. Similar estimates were also used for women 15-49 years and adolescent girls 10-19 years as other data were not available.
${ }^{e}$ UI, urinary iodine. IDD 2005. Note that because there is high variability in individual iodine excretion throughout the day, a single urine sample and resulting urinary iodine concentration cannot be considered to reflect an individual's iodine status. Therefore, it is not valid to calculate or present prevalence of iodine deficiency (which implies a count and comparison of people with adequate and inadequate iodine status). The lack of a prevalence estimate means that it was not technically appropriate to include iodine status as an indicator in the sample size calculation tool used to estimate the needed sample size for this survey. A summary of the number of samples to obtain for different levels of desired precision, with a $95 \%$ confidence interval, has been calculated in this reference: Andersen et al. Reliability of studies of iodine intake and recommendations for number of samples in groups and in individuals -British Journal of Nutrition (2008), 99, 813-818. However, these estimates still need to be adjusted for the expected design effect and non-response.

It is to be noted that the total sample size (IV) were obtained by multiplying the sample size per domain (III) by six, and the sample size per cluster (V) were obtained by dividing the largest total sample size (IV) for each target group by 180. In fact, if we wanted the estimates at development regions only, we would multiply per domain (III) by five instead of six, which would also give enough sample size for the estimates at Terai and Hill eco-zones (for instance, $355 * 5 / 180=9.86 \sim 10$, and $10 /$ cluster $* 75$ clusters $=750>355$ ). However, this would result in smaller sample size than that required for the estimates of the Mountain eco-zone (10/cluster * 30 clusters $=300<355$ ). Multiplication by 6 (or 12 observations per cluster solves this problem (12/cluster * 30 clusters $=360>355$ ). Also, adolescent boys 10-19 years were not the priority population in terms of programs for intervention, and were included only national level comparisons with the adolescent girls 10-19 years; thus, the total sample size required for the adolescent boys 10-19 years are same as the sample sizes for the domain.

The Table 2.3 shows the desired/expected sample sizes in each cluster, across five development regions, across three eco-zones, and the nation as a whole (180 clusters). All pregnant women 15-49 years identified in the sampled households were invited to participate. Based on the 2011 NDHS, 108 in total (approximately five percent of all reproductive age women), which is slightly less than one per cluster, were expected to be available for the study.

Table 2.3: Desired Sample Sizes for the Clusters, Development Regions and Ecological Region, Nepal National Micronutrient Status Survey, 2016

| Population Group | Desired/Expected Sample Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Each cluster | Each Development Region (36 clusters) | Mountain (30 clusters) | Hill/ Terai (75 clusters each) | Total (180 clusters) |
| Household | 24 | 864 | 720 | 1800 | 4320 |
| Children 6-59 months | 12 | 432 | 360 | 900 | 2160 |
| Children 6-9 years | 7 | 252 | 210 | 525 | 1260 |
| Adolescent girls 10-19 years | 12 | 432 | 360 | 900 | 2160 |
| Non-pregnant women 15-49 years | 12 | 432 | 360 | 900 | 2160 |
| Adolescent boys 10-19 years | 6 | 216 | 180 | 450 | 1080 |
| Pregnant Women 15-49 years | NA | NA | NA | NA | 108 |

Table 2.4 shows the number of samples selected and invited to participate in the survey, the actual number interviewed (un-weighted ' $n$ '), the response rate, and the weighted number of participants interviewed (weighted ' $n$ ') across the three eco-zones and the five development regions for the households as well as the six population groups ${ }^{2}$.

[^2]Table 2.4: Number of Households and the Individual Population Groups - Selected, Actually Interviewed, and the Response Rate, Nepal National Micronutrient Status Survey, 2016

| Result | Eco-zones |  |  | Development Regions |  |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Mountain | Hill | Terai | Eastern | Central | Western | $\begin{array}{c\|} \hline \text { Mid } \\ \text { western } \end{array}$ | $\begin{array}{c\|} \hline \text { Far } \\ \text { western } \end{array}$ |  |
| Household |  |  |  |  |  |  |  |  |  |
| Selected | 720 | 1800 | 1800 | 864 | 864 | 864 | 864 | 864 | 4320 |
| Interviewed | 719 | 1794 | 1796 | 864 | 862 | 859 | 862 | 862 | 4309 |
| Response Rate | 99.9 | 99.7 | 99.8 | 100.0 | 99.8 | 99.4 | 99.8 | 99.8 | 99.7 |
| Children 6-59 months |  |  |  |  |  |  |  |  |  |
| Selected | 277 | 714 | 737 | 336 | 358 | 298 | 356 | 380 | 1728 |
| Interviewed | 275 | 707 | 727 | 332 | 355 | 294 | 351 | 377 | 1709 |
| Response Rate | 99.3 | 99.0 | 98.6 | 98.8 | 99.2 | 98.7 | 98.6 | 99.2 | 98.9 |
| Children 6-9 years |  |  |  |  |  |  |  |  |  |
| Selected | 177 | 477 | 496 | 220 | 228 | 211 | 245 | 246 | 1150 |
| Interviewed | 177 | 476 | 485 | 218 | 227 | 205 | 244 | 244 | 1138 |
| Response Rate | 100 | 99.8 | 97.8 | 99.1 | 99.6 | 97.2 | 99.6 | 99.2 | 99.0 |
| Adolescent Boys 10-19 years |  |  |  |  |  |  |  |  |  |
| Selected | 163 | 439 | 443 | 211 | 212 | 198 | 208 | 216 | 1045 |
| Interviewed | 157 | 435 | 433 | 208 | 209 | 195 | 199 | 214 | 1025 |
| Response Rate | 96.3 | 99.1 | 97.7 | 98.6 | 98.6 | 98.5 | 95.7 | 99.1 | 98.1 |
| Adolescent Girls 10-19 years |  |  |  |  |  |  |  |  |  |
| Selected | 295 | 792 | 811 | 366 | 362 | 366 | 386 | 418 | 1898 |
| Interviewed | 291 | 782 | 792 | 357 | 357 | 353 | 383 | 415 | 1865 |
| Response Rate | 98.6 | 98.7 | 97.7 | 97.5 | 98.6 | 96.4 | 99.2 | 99.3 | 98.3 |
| Non-Pregnant Women 15-49 years |  |  |  |  |  |  |  |  |  |
| Selected | 360 | 900 | 900 | 432 | 432 | 432 | 432 | 432 | 2160 |
| Interviewed | 359 | 895 | 890 | 427 | 428 | 429 | 430 | 430 | 2144 |
| Response Rate | 99.7 | 99.4 | 98.9 | 98.8 | 99.1 | 99.3 | 99.5 | 99.5 | 99.3 |
| Pregnant Women 15-49 years |  |  |  |  |  |  |  |  |  |
| Selected | 24 | 89 | 98 | 46 | 46 | 36 | 46 | 37 | 211 |
| Interviewed | 22 | 89 | 96 | 45 | 45 | 36 | 45 | 36 | 207 |
| Response Rate | 91.7 | 100.0 | 98.0 | 97.8 | 97.8 | 100.0 | 97.8 | 97.3 | 98.1 |

### 2.3.2 Sample Size for Modified Relative-Dose-Response (MRDR) Test to assess Vitamin A Status

A review by Tanumihardjo (2011) describing vitamin A biomarkers recommends the use of Modified Relative-Dose-Response (MRDR) to measure vitamin A liver store while assessing deficiency through normal vitamin A status. Tanumihardjo recommends a cut off of MRDR value of $\geq 0.060$ to reflect VAD based on several human and rat studies. MRDR is a ratio of 3, 4-didehydroretinol to retinol, producing a MRDR value. Because retinol is homeostatically controlled, it is less responsive to treatment and MRDR provides more information, particularly in populations with marginal to adequate status.

The following formula gives the desired sample size for a set of given variance and margin of error-

$$
\mathrm{n}=\mathrm{Z}_{\mathrm{\alpha} / 2}{ }^{2 *} \sigma^{2} / \mathrm{ME}^{2} \text {, where }
$$

$\mathrm{Z}_{\alpha / 2}$ is the critical value of the normal distribution at $\alpha / 2$ (1.96 for a confidence level of 95 percent where $\alpha$ is 0.05 ), ME is the margin of error, $\sigma$ is the assumed population standard deviation (SD), and $n$ is the required minimum sample size per domain. Alternatively, the following equivalent formula can be used to compute the margin of error, and thereby the confidence interval (CI) for a given set of variance, sample size, and point estimate.

$$
\mathrm{CI}=\bar{X} \pm\left[\mathrm{Z}_{\alpha / 2}{ }^{2 *} \sigma^{2} / \mathrm{n}\right]^{0.5}
$$

OpenEpi version 2.3 was used to compute the 95 percent confidence intervals examining various sample sizes and the assumed point estimate and SD from the available data, and the
final decision about the sample size was made based on the appropriateness of the confidence intervals thus obtained.

Because of the lack of current data on vitamin A status, the mean and SD of the MRDR values for women from Ghana $(0.048 \pm 0.037)$ were used for Nepalese women. Using these figures, the estimated mean population MRDR value between $0.036-0.060$ with 95 percent confidence required sample size of 40 women. A design effect of two and an assumed response rate of 80 percent (as the required four-hour delay between dosing and the venous blood draw increased the likelihood of loss to follow up) were used ${ }^{3}$. This resulted in a required sample size of 100 ( $40 * 2=80 ; 80 / 0.8=100$ ) for non-pregnant women per reporting domain).

Similarly, the mean and SD of MRDR values for children 6-23 months from two districts in Nepal ( $0.043 \pm 0.02$ ) were used to calculate the estimated sample size needed for the children 659 months. The estimated mean population MRDR value between $0.038-0.049$ with 95 percent confidence required a sample size of 50 children. Assuming a design effect of two and 80 percent response rates, this required a minimum sample size of $125(50 * 2=100 ; 100 / 0.80=125)$ children for each reporting domain.

In each cluster, MRDR were collected from the first three households with eligible nonpregnant women 15-49 years, which resulted in a total sample size of 540 (i.e. 3*180). Similarly, MRDR was collected in each cluster from the first four households with eligible children 6-59 months of age, which resulted in a total sample size of 720 (i.e. $4 * 180$ ). The Table 2.5 describes the total expected number of MRDR samples collected from non-pregnant women 15-49 years and children 6-59 months for each cluster as well as the major analytic domains.

Table 2.5: Expected Sample Size for MRDR, Nepal National Micronutrient Status Survey, 2016

| Target Group | Expected Modified Relative Dose Response (MRDR) Sample Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Each Cluster | Each Development <br> Region (36 clusters) | Mountain (30 clusters) | Hill and Terai (75 clusters each) | Total (180 clusters) |
| Non-pregnant Women 15-49 years | 3 | 108 | $90^{*}$ | 225 | 540 |
| Children 6-59 months | 4 | 144 | $120 *$ | 300 | 720 |

*Although these figures for the Mountain regions are slightly less than the desired sample sizes (100 and 125 respectively), the confidence intervals they generate are still essentially the same

### 2.3.3 Sample Size for Fortified Foods

As part of the household questionnaire data collection, fortifiable wheat flour (purchased and potentially produced at large industrial roller mills) and salt were collected from the sampled households. Not too many households were expected to have fortifiable wheat flour available at the time of data collection. Therefore, one sample of fortifiable wheat flour was collected from every household where it was found. If more than one type of fortifiable wheat flour was present in the household, the type that was consumed most commonly was collected. Similarly, one sample of salt was collected from every other household (with odd number e.g. household no. $1,3,5$ ) in the survey, and if more than one type of salt was present in the household, the one that was consumed most commonly was collected. Therefore, as shown in Table 2.6, the actual number of food samples collected was expected to be less than the number of samples attempted to be collected.

[^3]Table 2.6: Expected Sample Size for Fortified Foods, Nepal National Micronutrient Status Survey, 2016

|  | Expected Sample Size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Food Type | Eluster | Each Development Region (36 clusters) | $\begin{array}{\|c\|} \hline \text { Mountain } \\ \hline \text { (30 clusters) } \end{array}$ | Hill and Terai (75 clusters each) | $\frac{\text { Total }}{(180 \text { clusters })}$ |
| Non-pregnant Women 15-49 years | 24 | 864 | 720 | 1,800 | 4,320 |
| Children 6-59 months | 12 | 432 | 360 | 900 | 2,160 |

### 2.4 Sample Weights

Because of the survey design and sampling used, appropriate weights were applied to get the estimates of interest at various national, ecological zone, development region and strata levels. However, for food samples collected (salt, wheat flour, etc.), sample weights were not applied to the data analysis due to high missing data (chapters 16, 17 and 18).

There were two major sampling weights to be constructed; the household weights and the individual weights. The household weight for a particular household is the inverse of the probability of the household being selected in the sample, multiplied by the inverse of the household response rate within the cluster. These household weights are adjusted for the differential selection probabilities of the individuals within the respective group of households and their respective response rates to get the individual weights for each of the population groups. The individual weight of a respondent's case is computed as the household weight multiplied by the inverse of the product of the individuals' selection probabilities and their response rates for each of the sampled clusters or cluster-segments for each population group. A total of 180 (equal to the total number of clusters selected) weights were then calculated.

Finally, these initial individual weights were standardized by dividing each of the individual weights by the average of the individual weights, so that the sum of the standardized weights equals the total number of samples for each population group. The entire process is done separately for each population group.

The following notations were used to compute the sampling probabilities and sampling weights.
$\mathrm{C}_{\mathrm{i}}$ : $\mathrm{i}^{\text {th }}$ cluster in the stratum ' s '
$\mathrm{H}_{\mathrm{jis}}$ : $\mathrm{j}^{\text {th }}$ household in the cluster $\mathrm{C}_{\text {is }}$
$\mathrm{a}_{\mathrm{s}}$ : Number of clusters selected in the stratum ' s '
$\mathrm{M}_{\mathrm{is}}$ : Number of households according to the sampling frame in the cluster $\mathrm{C}_{\mathrm{is}}$ before segmentation
$\Sigma \mathrm{M}_{\mathrm{is}}$ : Number of households according to the sampling frame in the stratum ' s '
$\mathrm{r}_{\text {is }}$ : Number of segments of the cluster $\mathrm{C}_{\text {is }}$ before household selection ( $\mathrm{r}_{\mathrm{is}}=1$ if $\mathrm{C}_{\text {is }}$ is not segmented)
$\mathrm{K}_{\text {is: }}$ : Number of households in the selected segment of the cluster $\mathrm{C}_{\text {is }}$ after segmentation $\left(\mathrm{K}_{\text {is }}=\right.$ $\mathrm{M}_{\mathrm{is}}$, if $\mathrm{C}_{\text {is }}$ is not segmented).
$g_{\text {is }}$ : Number of households selected for the interview from the cluster or cluster-segment $\mathrm{C}_{\text {is }}$
$\mathrm{Q}_{\text {is }}$ : Actual number of households interviewed from the cluster or cluster-segment $\mathrm{C}_{\text {is }}$
$\mathrm{P}_{1 i s}$ : First-stage sampling probability of the cluster $\mathrm{C}_{\text {is }}$ before it's segmentation
$\mathrm{P}_{2 \mathrm{jis}}$ : Second-stage sampling probability of the household $\mathrm{H}_{\mathrm{jis}}$ given that cluster $\mathrm{C}_{\mathrm{is}}$ is already selected
$\mathrm{P}_{\mathrm{jis}}$ : The probability that household $\mathrm{H}_{\mathrm{jis}}$ is selected and responds
$\mathrm{W}_{\mathrm{jis}}$ : The household weight for the household $\mathrm{H}_{\text {his }}$ ( $\mathrm{j}^{\text {th }}$ household in the cluster $\mathrm{C}_{\mathrm{is}}$ )
$\lambda_{\text {ist }}$ : Proportion of the individuals selected for interview relative to the total number of listed eligible individuals from the selected households as a target group ' $t$ ' (such as pregnant women 15-49 years) in the cluster $\mathrm{C}_{\text {is }}$
$\varphi_{\text {ist: }}$ The observed response rate of the target group ' $t$ ' in the cluster $\mathrm{C}_{\text {is }}$
$\theta_{\text {ist: }}$ The probability that an individual from the target group ' $t$ ' in the cluster $\mathrm{C}_{\mathrm{is}}$ is selected and responds
$\mathrm{W}_{\text {ist: }}$ The raw sampling weight (individual weight) assigned to the target group ' t ' individuals in the cluster $\mathrm{C}_{\text {is }}$
$\bar{W}_{\mathrm{t}}$ : Overall mean of $\mathrm{W}_{\text {ist }}$ across all target group ' t ' individuals observed across all clusters and strata.
$v_{\text {ist }}$ : Standardized individual weights assigned to target group ' t ' individuals in the cluster $\mathrm{C}_{\text {is }}$
With these notations at hand, the probabilities and the sampling weights were computed as below-
The probability that a cluster $\mathrm{C}_{\mathrm{is}}$ is selected before the segmentation is:

$$
\begin{equation*}
\mathrm{P}_{1 \mathrm{is}}=\left(\mathrm{a}_{\mathrm{s}} \times \mathrm{M}_{\mathrm{is}}\right) / \Sigma \mathrm{M}_{\mathrm{is}} \tag{1}
\end{equation*}
$$

The probability that a household $\mathrm{H}_{\mathrm{jis}}$ is selected given that the cluster $\mathrm{C}_{\mathrm{is}}$ is already selected (and possibly segmented) is:

$$
\begin{equation*}
\mathrm{P}_{2 \mathrm{jis}}=\left(1 / \mathrm{r}_{\mathrm{is}}\right) \times\left(\mathrm{g}_{\mathrm{is}} / \mathrm{K}_{\mathrm{is}}\right) \tag{2}
\end{equation*}
$$

The overall probability that a household $\mathrm{H}_{\mathrm{jis}}$ is selected and responds is:
$\mathrm{P}_{\mathrm{jis}}=\operatorname{Prob}\left(\mathrm{C}_{\mathrm{is}}\right.$ is selected $) \times \operatorname{Prob}\left(\mathrm{H}_{\mathrm{jis}}\right.$ is selected $\mid \mathrm{C}_{\mathrm{is}}$ is selected $) \times$ Response rate of the households within cluster $\mathrm{C}_{\text {is }}$

$$
\begin{array}{ll} 
& =\mathrm{P}_{1 \mathrm{is}} \times \mathrm{P}_{2 \mathrm{jis}} \times\left(\mathrm{Q}_{\text {is }} / \mathrm{g}_{\text {is }}\right) \\
=\left[\left(\mathrm{a}_{\mathrm{s}} \times \mathrm{M}_{\text {is }}\right) / \Sigma \mathrm{M}_{\mathrm{is}}\right] \times\left(1 / \mathrm{r}_{\mathrm{is}}\right) \times\left(\mathrm{g}_{\text {is }} / \mathrm{K}_{\text {is }}\right) \times\left(\mathrm{Q}_{\mathrm{is}} / \mathrm{g}_{i s}\right) \\
\text { i.e. } \quad & \mathrm{P}_{\mathrm{jis}}=\left(\mathrm{a}_{\mathrm{s}} \times \mathrm{M}_{\mathrm{is}} \times \mathrm{Q}_{\mathrm{is}}\right) /\left(\Sigma \mathrm{M}_{\mathrm{is}} \times \mathrm{r}_{\mathrm{is}} \times \mathrm{K}_{\mathrm{is}}\right) \tag{3}
\end{array}
$$

The household weight for the household $\mathrm{H}_{\mathrm{jis}}$ will then be-

$$
\begin{equation*}
\mathrm{W}_{\mathrm{jis}}=\left(1 / \mathrm{P}_{\mathrm{jis}}\right) \tag{4}
\end{equation*}
$$

The probability that an individual from a target group ' t ' in the cluster $\mathrm{C}_{\mathrm{is}}$ is selected and responds is:

$$
\begin{equation*}
\theta_{\text {ist }}=\mathrm{P}_{\mathrm{jis}} \times \lambda_{\mathrm{ist}} \times \varphi \tag{5}
\end{equation*}
$$

The individual weight assigned to the cluster $\mathrm{C}_{\text {is }}$ for target group ' t ' is:

$$
\begin{equation*}
\mathrm{W}_{\mathrm{ist}}=1 / \theta_{\mathrm{ist}}=\mathrm{W}_{\mathrm{jis}} /\left(\lambda_{\mathrm{ist}} \times \varphi_{\mathrm{ist}}\right) \tag{6}
\end{equation*}
$$

Finally, the standardized individual weight assigned to the cluster $\mathrm{C}_{\text {is }}$ for target group ' t ' is:

$$
\begin{equation*}
v_{\text {ist }}=\mathrm{W}_{\text {ist }} / \bar{W}_{\mathrm{t}} \tag{7}
\end{equation*}
$$

These individual weights ( $v_{\text {ist }}$ ) at the cluster levels were used to estimate the statistics at national as well as strata, development region or ecological zone levels. For households and housing characteristics, separate weight was applied.

### 2.5 Data Collection Tools

### 2.5.1 Survey Questionnaires

Six questionnaires were prepared to collect the relevant information pertaining to the households as well as the population groups - children 6-59 months, children 6-9 years, adolescent girls 10-19 years, adolescent boys 10-19 years, and women of reproductive age (1549 years) including both the pregnant and non-pregnant women.

The household refers to all individuals who, at the time of data collection, had lived in the same household for the past six months, and shared the same cooking pot. This also included those newly born and newly married, but excluded those who had recently migrated to other places for work or school and were not currently living in the household. The head of the household or another adult in the household responsible for or knowledgeable about household affairs was invited to participate in the household interview. With the help of the household respondents and personal observations by the field staffs, the household questionnaire was used to identify all members of the household who were eligible to participate in the survey, and to collect information on aspects such as socio-economic and socio-demographic characteristics of the household; use of mosquito nets; toilet type and sanitation situations; household food security; consumption patterns of selected fortification food vehicles (salt, fortifiable wheat flour and processed foods made with wheat flour) including the food labels and logo; and household's participation in key nutrition and other national programs.

The selected women of reproductive age 15-49 years, adolescent girls 10-19 years, adolescent boys $10-19$ years, and children $6-9$ years were the respondents for the questionnaires corresponding to these population groups. Mothers and caregivers were asked to participate as guardians in cases where children 6-9 years had difficulty responding to questionnaire, while the mothers or the caregivers were the respondents for the questionnaire for children 6-59 months.

The children 6-59 months questionnaire collected information on socio-demographic characteristics; participation in key national nutrition and other interventions; recent micronutrient supplementation intake (zinc, iron, folic acid, vitamin A, multiple micronutrient supplementation or powders); whether these supplementations were consumed within the last 24 hours; time since intake for zinc supplementation; time since last meal; recent intake of various food groups and beverages including animal source foods, dark leafy greens, nutrient poor foods (sugar sweetened beverages, noodles, biscuits, and fried snacks etc.); recent intake of fortified foods; two week recall of fever, cough, and diarrhea; and anthropometric measures. Also, the questionnaire was used to document the biological data collected pertaining to these children.

The children 6-9 years questionnaire was used to collect information on socio-demographic characteristics; dietary diversity scale; two weeks recall of fever, cough, and diarrhea; and for the documentation of the biological data collected from this population group.

The women of reproductive age (15-49 years) questionnaire and the adolescent girls (10-19 years) questionnaire collected information on socio-demographic characteristics; pregnancy and lactation status; participation in key national nutrition and other interventions; recent micronutrient supplementation intake (zinc, iron, folic acid, vitamin A, multiple micronutrient and whether these were consumed within the last 24 hours including the time since last intake for zinc supplementation; time since last meal; recent intake of various food groups and beverages including animal source foods, dark leafy greens, and nutrient poor foods (such as sugar sweetened beverages, noodles, biscuits, and fried snacks); recent intake of fortified foods; pica behavior (persistent eating of substances such as mud and dirt that have no nutritional value); night blindness; smoking habits; two week recall of fever, cough, and diarrhea; anthropometric measures; and documented the biological data collected from these population groups.

Finally, the adolescent boys (10-19 years) questionnaire collected information on sociodemographic characteristics; participation in key national nutrition and other interventions; recent micronutrient supplementation intake (zinc, iron, folic acid, vitamin A, multiple
micronutrient); dietary diversity scale; smoking habits; two-week recall of fever, cough, and diarrhea; anthropometric measures; and documented the biological data collected from this population group.

### 2.5.2 Global Positioning System (GPS)

Portable global positioning system (GPS) units were used to collect the geographic information system (GIS) data of the altitude, latitude and longitude of the selected households, the nearest health facility, and the Female Community Health Volunteer's (FCHV) households in each selected cluster. In case there were no health facility in the selected cluster, the GIS data of the closest facility in the neighboring cluster was collected. The altitude of each household were used to adjust hemoglobin data.

### 2.5.3 Anthropometric Measurements

Anthropometric measurements were collected from the selected population groups, with the exception of children 6-9 years, to assess nutritional status of the children, adolescents 10-19 years and adult women 15-49 years. Recumbent length was measured for children <24 months of age and standing height was measured for children $\geq 24$ months of age, adolescent boys and girls aged 10-19 years, and adult women 15-49 years, using a standard height/length-measuring board (Shorr-Board). An electronic SECA digital scale (UNICEF Electronic Scale or Uniscale) was used to measure the weight for all population groups. The scale allows for the weighing of very young children through an automatic mother-child adjustment that eliminates the mother's weight while she is standing on the scale with her baby. After the measurement, the results of anthropometric measurement were immediately recorded on the questionnaire.

### 2.5.4 Biological Specimen Collection

Blood, urine and stool samples were collected from the population group to assess their micronutrient status. Blood and urine were collected at the time of interview, while the stool samples were picked up by the teams from the households later that day or the following morning.

Following the standard procedures, trained phlebotomists collected 11ml of venous blood samples from the non-pregnant women $15-49$ years; 6 ml from pregnant women $15-49$ years, adolescent boys 10-19 years and adolescent girls 10-19 years; and 11ml from children 6-59 months of age. Butterfly needles were used to collect venous blood from all population groups. For non-pregnant women 15-49 years and children 6-59 months, three vacutainers (two 3 ml purple top with EDTA and one 5 ml blue top) were used for venous blood collection. Similarly, for pregnant women 15-49 years, adolescent boys and adolescent girls aged 10-19 years, two vacutainers (one 3 ml purple top and one 3 ml red top) were used. For non-pregnant women $15-$ 49 years and children 6-59 months selected for MRDR, an additional 3ml venous blood was collected in the purple top.

Field testing of collected biological samples was performed for some of the parameters in the field by the phlebotomist. This included tests for anemia (using HemoCue® Hb 301 analyzer), for malaria (using malaria antigen combo RTK), for Visceral leishmaniasis also known as KalaAzar (using Rapid Test Kit), and for Helicobacte pylori (using Rapid Test Kit for only adolescent boys and girls aged 10-19 years). STH were tested in the collected stool sample at the field level by Laboratory Technicians using the Kato-katz technique. The phlebotomist
explained all the test results to the mother or caregiver, and if needed, provided a referral to the nearest health facility for the treatment of anemia, malaria, or Kala-Azar.

A clean area was set up as a laboratory station in each cluster where laboratory technicians and pathologists processed and read the specimens. The blue top vacutainers were processed within one hour of collection by the laboratory technicians. The purple top vacutainers were used to prepare a whole blood lysate for the analysis of RBC folate, which was processed within four hours of blood collection. This was prepared before centrifugation of the purple top vacutainer. The purple top and red top vacutainers were kept in a cold box during the day until they were processed and/or transferred to the laboratory.

Another purple top labeled as 'BD purple top’ was not processed in the field, rather it was set aside to be transported to the laboratory in Kathmandu for complete blood count (CBC) and later for blood disorder analysis. BD purple top vacutainers were transported and analyzed within seven days of sample collection. The laboratory coordinator oversaw the entire handling and processing of specimen in the field.

The phlebotomist provided a special urine cup to the women 15-49 years (both non-pregnant and pregnant) and children 6-9 years during the interview and collected the sample at the same time. These urine samples were placed in 4 ml and 2 ml cryovials, labeled, placed into a cryovial box, and transferred to the pathologists in a portable freezer and stored until they were transported to the district/Public health offices (D/PHOs) to be stored at $-20^{\circ} \mathrm{C}$.

Stool samples were collected from the non-pregnant women 15-49 years and children 6-59 months and were stored in the cold box, and later transferred to pathologists for testing for STH. Pathologists performed Kato-katz method in the field using one gram of stool specimen. Within 24 hours of stool collection, the pathologist prepared duplicate microscope slides, and counted eggs using a portable microscope. The pathologist transferred one gram of stool to a second cryovial, and stored it in cold box and later transferred to a laboratory in Kathmandu for testing of H. Pylori.

Questionnaire based data including bio-specimens (blood, stool and urine) were collected in the field from all of the 180 clusters. Maintaining the temperature between $2^{\circ} \mathrm{C}$ to $8^{\circ} \mathrm{C}$, fresh blood samples were transported to the National Public Health Laboratory (NPHL) within seven days of sample collection. Bio-samples (serum, plasma and urine) were stored in $-86^{\circ} \mathrm{C}$ freezers in NPHL, half of which were shipped to the international laboratories located in China, Germany and Guatemala, while the remaining half were stored in National Public Health Laboratory (NPHL) as back-up samples. Complete Blood count (CBC) and blood disorder were analyzed by NPHL and Samyak Diagnostic Private Limited and the results were provided to New ERA. All the frozen stool samples were stored in Walter Reed/AFRIMS Research Unit Nepal (WARUN) until tested for testing of $H$. Pylori by Siddhi Poly Path Lab.

Table 2.7 describes the collected biological indicator for each population group and their level of representation:

Table 2.7: Biological Indicator, Population, Test and Level of Representatives, Nepal National Micronutrient Status Survey, 2016

| Biological indicator | Population | Method\& Test | Representativeness |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | National | 5 regions | 3 eco-zones |
| Anemia | Non-pregnant women 15-49 years | HemoCue <br> -Hemoglobin | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Iron Status | Non-pregnant women 15-49 years | ELISA ${ }^{\text {b }}$ <br> -Ferritin -soluble transferrin receptor (sTfR) | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Vitamin A status | Non-pregnant women 15-49 years | ELISA ${ }^{\text {b }}$ <br> -Retinol binding protein <br> (RBP) | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Vitamin A status | Non-pregnant women 15-49 years | HPLC <br> MRDR (subsample) ${ }^{\text {c }}$ <br> -Vit A liver stores <br> -Serum retinol | Yes ${ }^{\text {c }}$ | Yes ${ }^{\text {c }}$ | Yes ${ }^{\text {c }}$ |
|  | Children 6-59 months |  | Yes ${ }^{\text {c }}$ | Yes ${ }^{\text {c }}$ | Yes ${ }^{\text {c }}$ |
| Iodine Status | Non-pregnant women 15-49 years | Ammonium Persulfate method -Urinary iodine | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Children 6-9 months |  | Yes | Yes | Yes |
| Folate status | Non-pregnant women 15-49 years | Microbiological assay ${ }^{\text {e }}$ -RBC Folate | Yes | Yes | Yes |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Zinc status | Non-pregnant women 15-49 years | Atomic absorption | Yes | Yes | Yes |
|  | Children 6-59 months | -Serum zinc | Yes | Yes | Yes |
| Inflammation and/or infection | Non-pregnant women 15-49 years | ELISA ${ }^{\text {b }}$ <br> -Alpha-1-acid glycoprotein <br> (AGP) <br> -C-reactive protein (CRP) | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Malaria | Non-pregnant women 15-49 years | Malaria rapid diagnostic test kit <br> -Differential diagnosis of $P$. <br> falciparum + P. vivax | Yes | Yes | Yes |
|  | Pregnant women 15-49 years |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Blood disorders | Non-pregnant women 15-49 years | HPLC, DNA analysis, PCR, CBC <br> - $\alpha$-thalassemia <br> - $\beta$-thalassemia <br> -sickle cell, <br> -hemoglobin E, -glucose-6phosphate dehydrogenase deficiency (G6PD) | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Soil transmitted helminth infections | Non-pregnant women 15-49 years | Microscopic examination <br> Kato katz /stool <br> -Ascaris spp. <br> -Trichuris spp. <br> -hookworm spp | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Helicobacter pylori | Non-pregnant women 15-49 years | Immunoassay (stool) <br> -H. pylori | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
|  | Adolescent girls 10-19 years | H. pylori rapid test kit | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years | H. pylori rapid test kit | Yes | Yes | Yes |
| Visceral <br> Leishmaniasis | Non-pregnant women 15-49 years | Leishmaniadonovani antibody detection using the K39 antigen | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |
| Anthropometry | Non-pregnant women 15-49 years | Shorr length/height board \& electronic scale <br> -Height \& weight | Yes | Yes | Yes |
|  | Pregnant women 15-49 years ${ }^{\text {d }}$ |  | Yes ${ }^{\text {a }}$ | No | No |
|  | Adolescent girls 10-19 years |  | Yes | Yes | Yes |
|  | Adolescent boys 10-19 years |  | Yes | Yes | Yes |
|  | Children 6-59 months |  | Yes | Yes | Yes |

```
\({ }^{\text {a }}\) Sampling of pregnant women 15-49 years result in representative samples at the national and other levels; however, the sample sizes were
expected to be small and the confidence intervals wide, so the expectation was that data will be presented for the national level and but not for the
regions or eco-zones
\({ }^{6}\) ELISA includes 5 indicators of iron and vitamin A status, and inflammation: ferritin, soluble transferrin receptor (sTfR), retinol binding protein
(RBP), C-reactive protein (CRP) and alpha 1-acid glycoprotein (AGP)
\({ }^{\text {c }}\) MRDR, modified relative-dose-response test. This test requires consuming a small challenge dose of a retinol analog along with a fatty snack,
and collecting a blood sample 4 to 6 hours later (Tanumihardjo, 2011). Only a small number of samples for MRDR are needed. The MRDR test
also provides a value for serum retinol. The serum retinol values will be used to calibrate the cut off for RBP.
\({ }^{\mathrm{d}}\) To simplify team processes in the field both height and weight may be collected among pregnant women \(15-49\) years, but it is expected only
height will be used in analyses.
\({ }^{\text {e}}\) Microbiological assay: O'Broin S and Kelleher B 1992:Pfeiffer et al 2011
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Tables 2.8 and Table 2.9 describe the rationales for each biological indicator that was analyzed using a laboratory test or indicator, the cut-off values for the indicator, and the required volume for each biological specimen.

Table 2.8: Biological Indicator of Micronutrient Status, Laboratory Tests, Rationale, Recommended Cut-off Values, and Required Sample Volume, Nepal National Micronutrient Status Survey, 2016

| Indicators/ <br> laboratory tests | Rationales for the indicator and/or test | Recommended cut-off values and definitions of a public health problem, where applicable | Sample volume |
| :---: | :---: | :---: | :---: |
| Anemia/ Hemoglobin | Anemia is assessed through a photometric method using the HemoCue® Hemoglobin system on small blood samples. This method has shown satisfactory accuracy and precision in laboratory evaluations using standard methods ${ }^{\text {a }}$. A major advantage of the battery-operated HemoCue ${ }^{\circledR}$ photometer is that it readily displays hemoglobin levels with a delay of less than one minute and provides an opportunity to give participants immediate feedback regarding their anemia status. | Children 6-59 months: < $11.0 \mathrm{~g} / \mathrm{dL}$ <br> Children 5-11 years: <11.5 g/dL <br> Children 12-14 years: $<12.0 \mathrm{~g} / \mathrm{dL}$ <br> Non-pregnant women 15-49 years: <12.0 $\mathrm{g} / \mathrm{dL}$ <br> Pregnant women $15-49$ years: $<11.0 \mathrm{~g} / \mathrm{dL}$ <br> Men $\geq 15$ years: $<13.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{b}}$ <br> Hemoglobin values must be adjusted for altitude and smoking <br> Public health problem: <br> Anemia prevalence: <br> $\leq 4.9 \%$ - normal <br> 5.0-19.9\% - mild <br> 20.0-39.9\% - moderate <br> $\geq 40 \%$ - severe | $10 \mu \mathrm{~L}$ |
| Iron Deficiency/ Ferritin | Ferritin is the $\mathrm{WHO}^{\mathrm{b}}$ recommended indicator of iron deficiency in populations and is a measure of iron stores. Ferritin is an acute-phase reactant protein and is influenced by inflammation and infections. It is analyzed at low cost using the ELISA method. | Children <5 years: $<12 \mathrm{ug} / \mathrm{L}^{\mathrm{c}}$ <br> Children $\geq 5$ years and adults: $<15 \mu \mathrm{~g} / \mathrm{l}$ | $30 \mu \mathrm{~L}^{\text {d }}$ |
| Iron Deficiency/ sTfR | sTfR is an indicator of iron insufficiency when iron stores are depleted (and assuming the absence of other causes of abnormal erythropoiesis). It can be elevated by thalassemia and is thought to be less influenced by inflammation and infection than ferritin. It is analyzed at low cost using the ELISA method. | For all age groups: $>8.3 \mathrm{mg} / \mathrm{L}$ | $30 \mu \mathrm{~L}^{\text {d }}$ |


| Indicators/ <br> laboratory tests | Rationales for the indicator and/or test | Recommended cut-off values and definitions of a public health problem, where applicable | Sample volume |
| :---: | :---: | :---: | :---: |
| Vitamin A deficiency/ Retinol binding protein (RBP) | Indicator of vitamin A status shown to behave very similar to serum retinol. RBP is an acutephase reactant protein and is influenced by inflammation and infections. It can be analyzed at low cost using the ELISA method and is much less expensive compared to analysis costs for serum retinol. | RBP should be calibrated to serum retinol to determine cut offs. Retinol was measured from the first blood draw in a subsample of 200 children 6-59 months and 100 nonpregnant women of reproductive age (NP WRA) by the CDC Nutritional Biomarkers Laboratory. No more than $2.5 \%$ of retinol values were eliminated after applying an outlier test (CLSI EP9-A2 and CLSI EP9A2). The $\mathrm{R}^{2}$ in the subsample for RBP and retinol among children 6-59 months was 0.74 and among NP WRA was 0.78 . A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70$ $\mu \mathrm{mol} / \mathrm{L}$. <br> Children 6-59 months: RBP $<0.69 \mu \mathrm{~mol} / \mathrm{L}$ NP WRA: RBP $<0.64 \mu \mathrm{~mol} / \mathrm{L}$ | $30 \mu \mathrm{~L}^{\text {b }}$ |
| Vitamin A deficiency/ Serum retinol | WHO recommended vitamin A indicator assessed using HPLCe. Retinol is an acutephase reactant protein and is influenced by inflammation and infections. | For all age groups: <br> Mild $<0.70 \mu \mathrm{~mol} / \mathrm{L}$ <br> Moderate 0.35-0.69 $\mu \mathrm{mol} / \mathrm{L}$ <br> Severe $<0.35 \mu \mathrm{~mol} / \mathrm{L}^{\mathrm{d}}$ <br> Definition of a public health problem': prevalence of vitamin A deficiency (based on low serum retinol and unadjusted) 2-9\% - mild <br> 10-19\% - moderate <br> $\geq 20 \%$ - severe | $250 \mu \mathrm{~L}$ |
| Vitamin A status/ Modified relative dose response (MRDR) | MRDR measures vitamin A liver store. Bloodcirculating serum retinol is under homeostatic control of vitamin A liver store. As a result, it is common that retinol levels do not change after intervention, especially in settings where vitamin A status is adequate or marginal, as is expected in Nepal for some population groups. Measuring liver stores of vitamin A through MRDR is important to understand vitamin A status. MRDR is analyzed by HPLC ${ }^{e}$ and is used to assess deficiency through sufficiency but is not used for defining toxic levels. | For all age groups: <br> $\geq 0.060$ are indicative of insufficient vitamin <br> A liver reserves ${ }^{\text {e }}$ | $250 \mu \mathrm{~L}$ |
| Iodine/ Urinary iodine | The ammonium persulfate method is the WHO recommended method, involving simple spectrophotometric detection of the SandellKolthoff color reaction. | Children (6-9 years) and Non-Pregnant <br> Women (15-49 years): <br> Population median: <br> Excess $\geq 300 \mu \mathrm{~g} / \mathrm{L}$ <br> Above requirements 200-299 $\mu \mathrm{g} / \mathrm{L}$ <br> Sufficient 100-199 $\mu \mathrm{g} / \mathrm{L}$ <br> Mild deficiency 50-99 $\mu \mathrm{g} / \mathrm{L}$ <br> Moderate deficiency 20-49 $\mu \mathrm{g} / \mathrm{L}$ <br> Severe deficiency $<20 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}}$ <br> Pregnant Women (15-49 years): <br> Excess $\geq 500 \mu \mathrm{~g} / \mathrm{L}$ <br> Insufficient $<150 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{h}}$ | $250 \mu \mathrm{~L}$ |
| Folic acid/ RBC folate | Microbiological assay is the gold standard. <br> RBC folate reflects body stores over the last three months and is not influenced by recent intake. Serum folate does reflect recent intake and is elevated after eating or taking a supplement. When using only one indicator, as in this survey, RBC folate is the preferred indicator. | Children 6-59 months: $\begin{aligned} & <226.5 \mathrm{nmol} / \mathrm{L}^{\mathrm{f}} \\ & <305 \mathrm{nmol} / \mathrm{L}^{\mathrm{g}} \end{aligned}$ <br> Adolescent and adult women (10-49 years): $\begin{aligned} & <226.5 \mathrm{nmol} / \mathrm{L}^{\mathrm{i}} \\ & <305 \mathrm{nmol} / \mathrm{L}^{\mathrm{i}} \\ & <906 \mathrm{nmol} / \mathrm{L} \end{aligned}$ | $15 \mu \mathrm{~L}$ |


| Indicators/ <br> laboratory tests | Rationales for the indicator and/or test | Recommended cut-off values and definitions of a public health problem, where applicable | Sample volume |
| :---: | :---: | :---: | :---: |
| Zinc/ Serum zinc | Atomic absorption <br> Circulating zinc is influenced by diurnal variation, recent food intake (i.e., meal consumption causes a decrease in serum zinc concentration and this factor is cumulative with multiple meals), and recent supplement intake. Fasting samples are not possible in this survey so only non-fasting cut offs are shown. <br> The survey will ask about zinc supplement intake in the last 24 hours. <br> Zinc is also an acute-phase reactant protein and is influenced by inflammation and infections. | Children 6-59 months: <br> Morning, non-fasting: $<65 \mu \mathrm{~g} / \mathrm{dL}$ Afternoon, non-fasting: $<57 \mu \mathrm{~g} / \mathrm{dL}$ <br> Non-pregnant women 15-49 years: <br> Morning, non-fasting: <66 $\mu \mathrm{g} / \mathrm{dL}$ <br> Afternoon, non-fasting: $<59 \mu \mathrm{~g} / \mathrm{dL}$ <br> Morning is defined as sample collected before 1200 hours and afternoon as after 1200 hours. <br> To convert to $\mu \mathrm{mol} / \mathrm{L}$ divide by $6.54^{\mathrm{k}}$ <br> Zinc deficiency is of public health concern when the prevalence of low serum zinc concentration is greater than $20 \%{ }^{1}$ | $250 \mu \mathrm{~L}$ |

${ }^{\text {a }}$ Whitehead RD Jr, Zhang M, Sternberg MR, Schleicher RL, Drammeh B, Mapango C, Pfeiffer CM. Clin Biochem. 2017;50(9):513-520.
${ }^{\mathrm{b}}$ WHO. Hemoglobin concentrations for the diagnosis of anemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011
(http://www.who.int/vmnis/indicators/haemoglobin. pdf, accessed October 11, 2011.)
${ }^{c}$ UNICEF, United Nations University, WHO. Iron deficiency anemia, assessment, prevention, and control: a guide for programme managers. WHO/NUT/96.10. 2001. Geneva, WHO.
${ }^{\mathrm{d}}$ For ELISA which provides ferritin, sTfR, RBP, CRP, AGP
${ }^{\text {e}} \mathrm{WHO}$. Indicators for assessing vitamin A deficiency and their application in monitoring and evaluating intervention programmes. 1996. Geneva, WHO.
${ }^{r}$ MRDR also provides value for serum retinol
${ }^{\text {t }}$ Tanumihardjo, S.A. Vitamin A: biomarkers of nutrition for development. Am J ClinNutr 2011;94(suppl):658S-664S.
${ }^{\text {h }} \mathrm{WHO}$. Assessment of iodine deficiency disorders and monitoring their elimination. Accessed at:
http://whqlibdoc.who.int/publications/2007/9789241595827_eng.pdf
${ }^{i}$ Cut-offs for RBC folate among adults are based on homocysteine values or incidence of neural tube defects, which are not priority health events for children 6-59 months so cuts offs for children based on macrocytic anemia are suggested.
${ }^{j}$ WHO Technical Consultation. Conclusions of a WHO Technical Consultation on folate and vitamin B12 deficiencies. Food and Nutrition Bulletin 2008; 29(2 (Supplement)): S238-S244.
${ }^{\mathrm{k}}$ IZiNCG Technical Brief. No. 2, 2007. Assessing population zinc status with serum zinc concentration. Accessed at: http://www.izincg.org/pdf/English_brief2.pdf.
${ }^{1}$ deBenoist B, Darnton-Hill I, Davidsson L, Fonataine O, Hotz C. Conclusions of the Joint WHO/UNICEF/IAEA/IZiNC Gintragency meeting on zinc status indicators. Food and Nutrition Bulletin 2007;28(3):S480-S485.

Table 2.9: Biological Indicators of Inflammation, Infection, and Blood Disorders; Laboratory Tests; Rationale; Recommended Cut-off Values, and Required Sample Volume, Nepal National Micronutrient Status Survey, 2016

| Indicators/ <br> Laboratory Tests | Rationales for the indicator and/or test | Recommended cut-Off values | Sample volume |
| :---: | :---: | :---: | :---: |
| Inflammation AGP ( $\alpha 1$ acid glycoprotein) and CRP (C-reactive protein) | Ferritin, sTfR, RBP, serum retinol and zinc are acute-phase reactant proteins and are influenced by inflammation and infections. CRP and AGP will be measured to understand the influence of inflammation on these iron, vitamin A , and zinc indicators. | For all age groups: $\begin{aligned} & \text { AGP }>1.0 \mathrm{~g} / \mathrm{L} \\ & \mathrm{CRP}>5.0 \mathrm{mg} / \mathrm{L} \end{aligned}$ | $30 \mu \mathrm{~L}^{\text {a }}$ |
| Malaria/First Response ${ }^{\circledR}$ Malaria HRP2 Test kit | Malaria can cause anemia and may influence other vitamin and mineral status indicators ${ }^{\text {b }}$; it should be assessed to understand the contribution of malaria to anemia and other deficiencies in the populations. | For all age groups: <br> Test provides a dichotomous result positive or negative for malaria antibodies. It distinguishes falciparum and vivax. | $30 \mu \mathrm{~L}$ |
| Helicobacter pylori/H. pylori antigen detection | H. pylori infection causes gastric acidity and this can reduce absorption of vitamin $B_{12}$. It is also associated with anemia ${ }^{\text {c }}$. | For all age groups: <br> This test provides a dichotomous result - positive or negative for H. pylori antigens. | 1g |
| Visceral <br> Leishmaniasis(Kala-azar) | IT LEISH rapid diagnostic test using RK39 antigen to detect the L. donovani antibody. <br> Visceral Leishmaniasis can cause low blood counts, including anemia. | For all age groups: <br> Test provides a dichotomous result positive or negative for $L$. donovani antigens. | $30 \mu \mathrm{~L}$ |
| Soil-transmitted <br> Helminths/ Kato Katz | Soil-transmitted helminths can cause anemia and should be assessed to understand the etiology of anemia and influence of helminthes on other micronutrient status indicators ${ }^{\mathrm{d}}$. <br> This test involves counting eggs observed in the stool. Viewing under a microscope in the field must occur within 24 hr after stool collection and within 30 minutes after slide preparation. It can be presented as a dichotomous result - the presence or absence of eggs, or by intensity. | For all age groups: <br> Light-Intensity: <br> Ascaris lumbricoides: 1-4999 epg <br> Trichuris trichiura: 1-999 epg <br> Hookworms: 1-1999 epg <br> Moderate-Intensity: <br> Ascaris lumbricoides: 5000-49999 epg <br> Trichuristrichiura: 1000-9999 epg <br> Hookworms: 2000-3999 epg <br> Heavy-Intensity: <br> Ascaris lumbricoides: $\geq 50000 \mathrm{epg}$ <br> Trichuris trichiura: $\geq 10000 \mathrm{epg}$ <br> Hookworms: $\geq 4000$ epg | 1 g |
| Blood disorders: $\alpha$ thalassemia, $\beta$ thalassemia, sickle cell, hemoglobin E, and glucose-6-phosphate dehydrogenase deficiency (G6PD)/ Complete blood count (CBC) ${ }^{\mathrm{f}}$ and genetic testing | CBC will provide information on the types and numbers of cells in the blood which is needed to assess blood disorders. Blood disorders can cause anemia and may influence other indicators of micronutrient status. In addition, some blood disorders may offer protection against malaria ${ }^{\text {g }}$. | Genetic testing will provide a dichotomous result - the presence or absence of specific blood disorders and traits: $\alpha$-thalassemia, $\beta$-thalassemia, sickle cell, hemoglobin E, and glucose-6phosphate dehydrogenase deficiency (G6PD) ${ }^{\text {h }}$ | 3 mL |

[^4]
### 2.5.5 Food Sample Collection

As part of the household questionnaire data collection, samples of fortifiable wheat flour (purchased wheat flour potentially produced by industrial roller mills) were collected from every household available at the time of data collection to test for iron content in the flour, and salt samples were collected from every other household to test for iodine in the salt. If more than one type of flour or salt was present, the one most commonly consumed by the household was collected. Wheat flour and salt samples were transported to DFTQC, Babar Mahal on a weekly basis for measuring the iron and iodine respectively, and the remaining samples were stored in New ERA.

Table 2.10: Food Sample, Test, Rationale and Volume of Sample, Nepal National Micronutrient Status Survey, 2016

| Foods | Test | Rationale | Volume of sample |
| :---: | :---: | :---: | :---: |
| Salt | Salt Iodine Titration Method | This method is the gold standard to test iodine in salt. <br> Non-iodized salt: 0 ppm <br> Iodized salt: $\geq 0 \mathrm{ppm}$ <br> Adequately iodized salt (WHO) ${ }^{\text {a }}$ : $>15 \mathrm{ppm}$ and $<40 \mathrm{ppm}$ <br> Adequately iodized salt (Nepal) ${ }^{\text {b }}: \geq 15 \mathrm{ppm}$ | 30 g |
| Wheat flour | Iron spot test | This qualitative method is the only test that can identify iron fortificant. The samples that test positive, and a subset of the negative, will be tested using the AOAC method. |  |
| Wheat flour | AOAC International Official Method 999.11 (Dry ashing and flame atomic absorption spectrometry (FAAS)) | This method is a standard method for quantitatively determining iron in flour. <br> The cut off is $<60 \mathrm{mg} / \mathrm{kg}$ minimum <br> We will also examine the distribution of iron in flour $<30 \mathrm{mg} / \mathrm{kg}, 30-39.9 \mathrm{mg} / \mathrm{kg}, 40-49.9 \mathrm{mg} / \mathrm{kg}, 50-59.9 \mathrm{mg} / \mathrm{kg}$, $60 \mathrm{mg} / \mathrm{kg}, 60-69.9 \mathrm{~kg} / \mathrm{mg}, 70-79.9 \mathrm{~kg} / \mathrm{mg}, 80+\mathrm{mg} / \mathrm{kg}$ <br> Nepal's Food Standard: <br> Elemental Iron: $60 \mathrm{mg} / \mathrm{Kg}$ (minimum) <br> Vitamin A: $1 \mathrm{mg} / \mathrm{kg}$ (minimum) <br> Folic Acid: $1.5 \mathrm{mg} / \mathrm{Kg}$ (minimum) | 250 g |

${ }^{\mathrm{a}}$ WHO. Assessment of iodine deficiency disorders and monitoring their elimination considers salt iodized with $15-40 \mathrm{ppm}$ at the household level to be adequately iodized. This definition will be used to allow for global comparisons
${ }^{\mathrm{b}}$ In previous surveys in Nepal, $\geq 15 \mathrm{ppm}$ has been used to indicate adequately iodized salt. This definition will also be calculated to allow for comparison to other surveys in Nepal.

### 2.6 Survey Team Structure, Recruitment and Training

The survey team consisted of a total of 136 field staffs, including four field managers/quality controllers, 11 supervisors, 66 enumerators, 33 phlebotomists, 11 lab technicians and 11 laboratory coordinators. The field managers, supervisors and enumerators were selected from the pool of New ERA field researchers, who had already worked in other similar surveys. The guiding principle in selection of enumerators and supervisors was work experience in relevant area, caste and ethnic diversity, work experience in rural communities, academic qualification, language known/spoken, and rapport building capacity. Phlebotomists, laboratory technicians and laboratory coordinators were selected after interviewing those who were short-listed. Ten percent back-up team was recruited and was invited to participate in the training. Each field staff was evaluated for their performances in the training and was further screened. A separate

Census Team of 20 members were also recruited for conducting the census and listing of the eligible population groups in the selected clusters.

A twelve-days intensive training was conducted for the field survey team. The purpose of the training was (i) to orient and make the enumerators understand the basics of NNMSS, (ii) enable them to understand the sampling process, (iii) raise awareness in general ethical principles and collecting signed informed consent, and (iv) make them understand the various data collection tools and techniques.

The training included, among others, explanation of the objectives of the survey; concept of multistage cluster survey, selection of the clusters, households and the population groups; the consent taking process; structure of the questionnaires, and their administration including skipping, filtering and probing techniques; role play and mock interviews for checking the content, consistency, validity, reliability and flow of the questionnaires; data recording; anthropometric measurements; use of GPS and the related concepts such as longitude, latitude and altitude; quality control by the interviewers and supervisors; intravenous blood sample collection by phlebotomist; collection of urine and stool; laboratory processing of the biological specimen; field testing of hemoglobin, malaria and H. pylori; Kato Katz for STH; cold chain maintenance; quality control by laboratory coordinator; and the overall roles and responsibilities of the field team members. The training was conducted by the core survey team members of New ERA and US CDC, Atlanta with a view to making the trainees familiar with the study objective and its instruments. The Phlebotomists, Laboratory technicians and Laboratory coordinators were trained by the US CDC, Atlanta laboratory personnel. A four days' training was also carried out for the census team on how to conduct the census.

### 2.7 Pre-testing, Pilot Testing and Finalization of Survey Tools

Prior to the actual survey, the field supervisors were trained for three days for the pre-testing of the survey questionnaires to examine the adequacy of the questions; clarity/wording of questions; adequacy of possible responses (pre-coded); sequence/flow of questions; and skip patterns. All the field staff including the field managers/quality controllers, supervisors, enumerators, laboratory coordinators, phlebotomists and laboratory technicians were then deployed to Kavrepalanchowk and Makwanpur districts from 24 to 27 March, 2016 for the pilot testing of the survey tools and all field procedures. Altogether, fourteen teams were formed including one supervisor, six enumerators, three phlebotomists, one laboratory technician for blood sample processing, one laboratory technician for stool sample collection and one laboratory coordinator in each team. Nine teams were sent to Patalekhet, Panchkhal, and Anaikot VDCs of Kavrepalanchowk while the remaining five teams were sent to Daman, Tistung and Palung VDCs of Makwanpur. The teams conducted the listing and mapping of the households in the clusters, sampled the households, conducted the census of the selected households, screened the available respondents in the sampled households, and selected the respondents. Each team followed the whole process of data collection in 30 households, during which all six questionnaires were tested with the relevant population group. The core survey members later examined the completed questionnaires and sat with the pre-test team to discuss the adequacy of each question. In light of the experience gained, the questionnaires along with the laboratory forms and the guidelines were finalized.

### 2.8 Prior Field Work

Prior to entering the clusters in the assigned district, the team supervisor approached with the Chief of $\mathrm{D}(\mathrm{P}) \mathrm{HO}$ District Officer and District Health Officer to schedule a District Stakeholders Coordination Meeting. Once the date for this meeting was finalized, both supervisor and technical staff from the team made a presentation at the $\mathrm{D}(\mathrm{P}) \mathrm{HO}$. The main purpose of district stakeholder coordination meeting was to give an overview of the planned survey, its aims and objectives, sampling methods and other field procedures of the survey.

With the letter provided by $\mathrm{D}(\mathrm{P}) \mathrm{HO}$ addressing the health institution, the teams entered the assigned cluster, where they coordinated with the local health workers and the female community health volunteers (FCHVs). With the help of local health workers, the team arranged a cluster level coordination meeting where the local leaders, social workers, teachers, mother's group and intellectuals from the community were asked to participate. The main aim of the cluster coordination meeting was to gain support from the local people and to build the trust and rapport between the field surveyors and the community. The team then divided up into five to six groups (two members in each group) to start the survey by listing the households in their respective cluster, where one member made a line-listing of the households, and the other made a rough sketch of waypoints.

### 2.9 Ethical Clearance, Consents from the Participants, Incentives and Privacy of Information

The ethical clearance letter for the NNMSS was received from NHRC on February 18, 2016. Likewise, informed consent was received from the survey respondents prior to their participation. It was particularly important to ease out the skepticism and fear on the part of the respondents as to signing an informed consent document and thereby address the potential for high refusal rates. After clearly explaining the survey goals, procedures, risks and benefits, and how their participation in the survey would contribute for the society in simple terms, written informed consent was obtained from those who could read, whereas oral informed consent coupled with the witness signatures were obtained from those who could not read. For this, the interviewer would read the informed consent to each participant, and if the consent was given, then the interviewer would mark the consent form and proceed with the survey. The participants were assured that the privacy of their personal information would be maintained and used only for the study.

The first informed consent was received from the respondent for the household interview (either the household head 18 years and above) or other adult responsible for or knowledgeable about the purchasing of household foods. Signed consents were also obtained from each of the participants 18 years and older selected for an interview and biological specimen collection. Legal guardians or parents of children 6-9 years and adolescents 10-19 years provided the formal consents on behalf of the latter, wherein the participants 7 to below 18 years also provided their oral assent for the interview and biological data collection.

As recognition of the survey burden and as an incentive, the households selected to participate in the survey were given a gift that included a towel, a toothpaste, a toothbrush, a soap, a nail cutter, and one kg of iodized salt as a token of appreciation for their time and support. Participants involved in MRDR collection (which would require them to take a dose of vitamin
$\mathrm{A}_{2}$, avoid vitamin A rich food for four to five hours, and provide an additional venous sample collection after four to five hours) received an additional gift including a blanket to children 659 months or a shawl to women 15-49 years.

### 2.10 Field Work Schedule

The field team departed to the field on 01 April, 2016. There were a total of 14 teams. Each team consisted of 13 members including one supervisor, six enumerators, three phlebotomists, two laboratory technicians each for blood sample processing and stool sample processing, and one laboratory coordinator. In addition, each team had two people for quick transfer of the fresh blood sample to Kathmandu for quick assessment of blood disorders. Each field team was provided with a field schedule before their departure to the assigned clusters. The entire data collection for NNMSS was completed on 25 June 2016.

### 2.11 Data Coding, Data Entry and Quality Control

To ensure the quality of the data, the collected questionnaires, and biological and food specimens were reviewed by the supervisor and laboratory coordinator before they left the cluster, and any errors found were corrected in the field. All completed questionnaires were reviewed for consistency and completeness by the supervisor the same evening, and control forms were used to monitor the sampled households, questionnaires, cold chain, and custody of biological and food specimens. Field work observations were carried out by the members of steering and working group committee and also by the expert group to support high quality data collection.

Protocols on quality assurance were adhered through the standardization of equipment and procedures as outlined in the laboratory manual and successful participation in US CDC, Atlanta's external quality assurance programs, including VITAL-EQA and EQUIP. All laboratories conducting biological and food analyses were required to follow the quality control procedures, and US CDC reviewed the quality control data for biological indicators produced from contracting labs prior to the survey. Back-up samples, if deemed necessary, for duplicate analyses were stored at the NPHL in Kathmandu.

At the center, a software package for data entry was developed in CSPro version 6.1 by the data manager immediately after mobilizing the field teams. The computer programming for data entry and analysis was based on questionnaires and expected outputs. A number of quality check mechanisms such as range checks and skip instructions were developed in order to detect any errors during the data entry stage. Particularly, the questionnaires were thoroughly checked by the coders before the data entry to code the responses in 'others' category correctly. The data from the field were then entered using the double entry process, after which the data manager verified and edited the data set before finalizing it.

### 2.12 Data Analysis

Data were analyzed at the individual level using SPSS version 20. The complex design of the stratified multi-stage cluster survey was taken into account for all analysis. The data were analysed using the SPSS statistical package with the complex sample module. All data were examined for missing values and data distributions for biological indicators were examined for normality in the whole sample. Confidence interval and chi-square test assessed significant differences between the categories. $P$-values $<0.05$ were considered statistically significant. Because of the potential for unreliable estimates, proportions and $95 \%$ confidence intervals were suppressed for estimates based on fewer than 25 observations. Data in parentheses are presented in tables for values based on 25-49 observations and should be viewed with caution. Select micronutrient biomarkers were adjusted for inflammation and a principal component analysis produced the wealth index, both further described below. Anthropometry data quality checks included examining missing values, end-digit preference, removing biologically implausible values, and reviewing standard deviations of $z$-scores. International IYCF indicators were calculated following WHO (2008; 2010) guidance. See Tables 2.8-2.10 for a summary of the biological indicators and cut-offs to define deficiency or status; hemoglobin adjustments for altitude and smoking; and nutrients in food samples.

## Inflammation-Adjusted Micronutrient Biomarkers

Some indicators of micronutrient status are influenced by the inflammatory process which can lead to either over- or under-estimation of deficiency. By collecting biomarkers of inflammation, it is possible to adjust for the influence of inflammation on micronutrient indicators.

The Biomarkers Reflecting Inflammation and Nutrition Determinants of Anemia (BRINDA) working group - a multi-agency and multi-country collaboration to improve micronutrient assessment and anemia characterization-used pooled data from national and regionally representative nutrition surveys from 17 countries representing all 6 WHO geographic regions to develop a correction approach to adjust for inflammation in high risk population groups including children 6-59 months, school age children, and women of reproductive age (WRA).

The BRINDA working group recommends using two acute phase proteins (C reactive protein [CRP] and $\alpha 1$-acid glycoprotein [AGP]) to adjust serum ferritin, sTfR (children 6-59 months and WRA), and RBP (children 6-59 months only) using a regression correction approach. In short, a linear regression is run with the micronutrient indicator as the dependent variable and CRP and/or AGP as the independent variable(s). The slope of CRP and/or AGP are then used to adjust for the effect of inflammation on the micronutrient indicator. To avoid overadjustment, the maximum of the lowest decile of CRP and AGP from the pooled BRINDA data set are used as reference values. Because there appear to be no clear cutoffs for elevated CRP and AGP which predict their effect on nutrient biomarkers, the regression approach to account for the effects of inflammation is preferred because it better reflects the relation between CRP, AGP, and nutrient biomarkers (Suchdev et.al. Adv Nutr 2016; 7:349-56). The details of the regression correction are published elsewhere (Am J Clin Nutr supplement, June 2017).

Yet unpublished guidance from BRINDA 2 - a continuation of the original BRINDA working group - recommends adjusting serum zinc for children 6-59 months. No inflammation adjustments are recommended for serum zinc among women of reproductive age or for folate in either young children or women.

To date, there are no published guidelines for adjusting biomarkers among adolescents. To account for the influence of inflammation in this age group, the data presented for adolescent girls 10-19 years in this report follow recommendations for WRA.

## Wealth Quintile

The wealth quintile was constructed using the first principle component of household assets and characteristics including types of materials used for flooring, roofing and external walls, source of drinking water, and possession of sanitation facilities. Each asset was assigned a weight (factor score) generated throughout principle components analysis, and the resulting asset scores were standardized in relation to a normal distribution with a mean of zero and standard deviation of one (Gwatkin et.al., 2000). Each household was then assigned a score for each asset and the scores were summed for each household. The sample was then divided into quintiles from lowest to five (highest). A single asset index was developed for each household.

### 2.13 Response Rate for Interview and Biological Samples

Table 2.11 through 2.13 summarize the response rate for interviews and biological sample collection among each population group. Further, response rates for food sample collection are also shown in Table 2.14.

Table 2.11: Response Rate for Questionnaire by Population Group, Nepal National Micronutrient Status Survey, 2016

| Population group | Sample size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} \text { Planned }^{\mathrm{a}} \\ \mathrm{~N} \end{gathered}$ | $\begin{gathered} \text { Available }^{\mathrm{b}} \\ \mathrm{~N} \end{gathered}$ | $\begin{aligned} & \text { Interview } \\ & \text { Completeed }{ }^{\text {c }} \\ & \text { N (\%) } \end{aligned}$ | $\begin{gathered} \text { Refused }^{\mathrm{d}} \\ \text { N(\%) } \end{gathered}$ | Respondent not at home after three attempts N (\%) |
| Household | 4,320 | 4,320 | 4,309 (99.7) | 5 (0.1) | 6 (0.1) |
| Children 6-59 months | 2,160 | 1,728 | 1,709 (98.9) | 5 (0.3) | 14 (0.8) |
| Children 6-9 years | 1,260 | 1,150 | 1,138 (99.0) | 3 (0.3) | 9 (0.8) |
| Adolescent boys 10-19 years | 1,080 | 1,045 | 1,025 (98.1) | 8 (0.8) | 12 (1.1) |
| Adolescent girls 10-19 years | 2,160 | 1,898 | 1,865 (98.3) | 9 (0.5) | 24 (1.3) |
| Non-pregnant women 15-49 years | 2,160 | 2,160 | 2,144 (99.3) | 8 (0.4) | 8 (0.4) |
| Pregnant women 15-49 years ${ }^{\text {b }}$ | 108 | 211 | 207 (98.1) | 1 (0.5) | 3 (1.4) |
| ${ }^{\text {a }}$ Based on survey design and sample size calculation <br> ${ }^{\mathrm{b}}$ Available sample in the clusters <br> ${ }^{\text {CPrcentage based on available sample size }}$ <br> ${ }^{\text {d}}$ Refused: Refused, sick and disabled |  |  |  |  |  |

Table 2.12: Response Rate for Blood Sample Collection by Population Group Among those with a Completed Interview, Nepal National Micronutrient Status Survey, 2016

| Population group | Sample size |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Complete blood sample collection ${ }^{\text {a }}$ N (\%) | Partial blood sample collection ${ }^{\text {a }}$ N (\%) | Refused for blood sample collection ${ }^{\text {a }}$ $\mathrm{N}(\%)$ | Available Sample Size for MRDR | Complete MRDR data collection N (\%) |
| Children 6-59 months | 1,634 (94.6) | 27 (1.6) | 48 (2.8) | 720 | 659 (91.5) |
| Adolescent boys 10-19 years | 1,012 (96.8) | 11 (1.1) | 2 (0.2) | NA | NA |
| Adolescent girls 10-19 years | 1,839 (96.9) | 16 (0.8) | 10 (0.5) | NA | NA |
| Non-pregnant women 15-49 years | 2,128 (98.5) | 8 (0.4) | 8 (0.4) | 540 | 529 (97.7) |
| Pregnant women 15-49 years | 200 (94.8) | 5 (2.4) | 2 (0.9) | NA | NA |

[^5]Table 2.13: Response Rate for Urine and Stool Collection by Population Group Among those with a Completed Interview, Nepal National Micronutrient Status Survey, 2016

| Population group | Sample size |  |
| :--- | ---: | ---: |
|  | Sample Collection <br>  <br> URINE <br> $\mathbf{N}(\%)$ | Refused for sample <br> collection ${ }^{\mathbf{N}} \mathbf{N}(\%)$ |
| Children 6-9 years |  | $4(0.4)$ |
| Non-pregnant women 15-49 years | $1,134(99.6)$ | $15(0.7)$ |
| Pregnant women 15-49 years | $2,129(99.3)$ | $4(1.9)$ |
| STOOL | $203(98.1)$ | $175(10.2)$ |
| Children 6-59 months |  | $136(6.3)$ |
| Non-pregnant women 15-49 years | $1,534(89.8)$ |  |

${ }^{\text {as Percentage based on interview completed }}$

Table 2.14: Response Rate for Fortifiable Salt and Wheat Flour Samples Collection from Households, Nepal National Micronutrient Status Survey, 2016

| Fortifiable foods | Sample size |  |  |
| :---: | :---: | :---: | :---: |
|  | Complete Sample collection ${ }^{\text {a }}$ N (\%) | Refused, not collected ${ }^{\text {a }}$ <br> N (\%) | Insufficient quantity, not collected ${ }^{\text {a }}$ N (\%) |
| Salt | 2,109 (97.6) | 15 (0.7) | 36 (1.7) |
| Wheat flour | 967 | - | - |

${ }^{\text {a Percentage based on interview completed. Salt was to be collected in every other household. }}$
It was expected that few households would have purchased wheat flour samples (potentially produced at large industrial roller mills) available at the time of data collection, and therefore samples were collected from every household in the survey where they were found.

## C H A P TER 3

## Household and Individual

 Characteristics of the Survey PopulationThe ensuing sections highlight the background characteristics of the households interviewed in the survey, including the demographic characteristics; the households' access to drinking water and basic sanitation; housing characteristics; possession of durable assets and the wealth quintile as an indicator of socioeconomic index; education of the target population; household food security; and the major impacts of the massive earthquake of 2015 and other external shocks to the households.

### 3.1 Characteristics of the Survey Population

A total of 1,709 children aged $6-59$ months participated in the survey (Table 3.1). Among the children 6-59 months participating in the survey, 37 percent were from the Central development region and 10 percent were from the Far-western region. Only nine percent of children were selected from the Mountain ecozone whereas 47 percent and 44 percent of children were selected from the Hill and Terai ecozones, respectively. Approximately one in ten (11 percent) children were from urban areas and the remaining nine in ten (89 percent) were from rural areas. Thirty percent of children selected were under 6-23 months. Fifty-three percent of children were male and 47 percent female. A quarter of the children's mother had no education, about two in ten had a primary level of education, 28 percent had some secondary and 29 percent had school leaving certificate (SLC) equivalent to grade 10 or above level of education. By ethnicity, 23 percent of children were from the Hill Janajati and 20 percent from the Hill Chhetri caste groups; membership in other caste groups ranged from 12 to two percent.

Table 3.2 shows 1,138 children aged 6-9 years participated in the survey. The participation of children 6-9 years from each development region, ecological zone and urban/rural location were similar to children 6-59 months in that 38 percent were selected from Central region, 52 percent from the Terai ecozone, and 89 percent from rural areas. Almost the same proportions of children were selected from the age groups of 6-7 years and 8-9 years (49 percent and 51 percent, respectively) and half were female. By ethnicity, 24 percent of children 6-9 years were from the Hill Janajati caste group.

A total of 1,025 adolescent boys aged 10-19 years participated in the survey. Among the total boys, 33 percent were from the Central region, 51 percent from the Terai ecozone, and 86 percent from rural areas. The percentage of children 10-11 years, $12-13$ years and 14-15 years ranged from 21-24; the percentage of children 16-17 years and 18-19 years was about 16 each. Almost three percent of adolescent boys 10-19 years were married (Table 3.3).

Selected characteristics of adolescent girls aged 10-19 years are shown in Table 3.4. A total of 1,865 girls participated in the survey where 32 percent were from the Central region, 49 percent from the Terai ecozone, and 90 percent from rural areas. Among the adolescent girls, 24 percent were 12-13 years of age. Among all adolescent girls 10-19 years, slightly over one in ten (11 percent) were married while less than a percent were currently pregnant. Among adolescent girls 10-19 years who had given birth in the last 5 years, 93 percent were currently lactating.

Table 3.5 shows that 2,351 women aged 15-49 years participated in the survey. Among them, 36 percent were from the Central region, 51 percent from the Terai ecozone, and 87 percent from rural areas. Forty-three percent of women in their twenties, 11 percent of women in 1519 years and 16 percent in the age group 40-49 years were selected. Among all women 15-49 years, 13 percent were never married, 86 percent were married, one percent were widowed and less than one percent were divorced. Nine percent of women 15-49 years were currently pregnant and 70 percent of women who had given birth in the last 5 years were currently lactating.

### 3.2 Educational Attainment of the Survey Population

Table 3.6-3.9 presents the information on educational attainment of the selected population groups (other than children 6-59 months of age). A majority (96 percent) of the children 6-9 years had completed some primary level education, while four percent had no education at all (Table 3.6) Three children 6-9 years out of 1136 had some secondary level of education (data not shown). Seven percent of children in Terai had no education. No education tends to decrease with the increasing age of children (10 percent of 6 year olds and one percent of 9 year olds had no education) (Table 3.6).

Only one percent of adolescent boys 10-19 years did not have any education. Almost one third (32 percent) of adolescent boys 10-19 years had primary level education, over half had some secondary (52 percent), and 16 percent had above the secondary level of education (Table 3.7).

Among adolescent girls 10-19 years, overall five percent had no education, almost three in ten had primary level of education, slightly over half had some secondary, and 15 percent had the higher secondary level of education or higher (Table 3.8). Among adolescent girls 10-19 years, eight percent in the Central region and one percent in the Far-western region had no education.

All adolescent girls 10-19 years in the Mountain region have education while one percent in Hill and nine percent in Terai had no education. Among adolescent girls in their late teen age (18-19 years), nine percent had no education while one percent of adolescents in their early age (10-11 years) had no education. By ethnicity, 18 percent in the other Terai caste group, and 17 percent in the Terai Dalit caste group had no education. Among the adolescent girls 1019 years who belonged to Hill Brahmin 35 percent had completed SLC (grade 10) and above and 22 percent who belonged to Newar caste group completed this level (Table 3.8).

Table 3.9 shows the education level of reproductive aged women 15-49 years. Among women 15-49 years overall, only one percent had no education, 16 percent had primary, over a quarter had secondary and six in ten had a higher secondary level of education or higher (Table 3.9). Among all, four percent of women 15-49 years with no education were from the Terai Dalit caste group. Sixty-four percent of women 15-49 years from the Central region had achieved the highest levels of education, as did 64 percent of women 15-49 years in the Mountain. By current pregnancy status, fewer pregnant women 15-49 years had reached the highest levels of education compared to non-pregnant women 15-49 years ( 49 percent versus 58 percent). Seventy-one percent of women 15-49 years from other Terai caste group achieved the highest levels of education (Table 3.9).

### 3.3 Household and Housing Characteristics

A description of the distribution of total households interviewed, female respondents for household questionnaire, and mean age of the respondent of household head is shown in Table 3.10. Among the total 4,309 households that participated in the survey, over one-third were from the Central region, almost a quarter were from the Eastern region, 20 percent were from the Western region, 13 percent from the Mid-western and nine percent were from the Farwestern region. More than two-thirds (68 percent) of the household respondents were female, 76 percent in Western region, 71 percent in Hill and 73 percent in the urban areas. The mean age of the household respondent was 40 years with a standard deviation of about 13.8 years, both of which did not vary much across various geographic and ethnic strata (Table 3.10).

Table 3.11 describes the number of persons living in the households surveyed. Number of persons in the household is defined as those that have lived in the household for the past six months and share the same cooking pot. This also includes those newly born, newly married, and excludes those who have recently migrated and will not return for at least six months. The mean household size was 4.6 with a standard deviation of 2.2 . The number of people in a household ranged from one to 22 . More than half ( 54 percent) of the households have 4 to 6 members, while 31 percent have 1 to 3 members, 13 percent have 7 to 10 members, and two percent have more than 10 members. The mean number of people in the households was 5.1 in the Far-western region. Among different ethnic and caste groups, the mean was 6.6 among the Muslim group, 5.8 among the other Terai caste, and 5.3 among the Terai Dalit (Table 3.11).

The population in the selected households was 19,962; 54 percent of these individual were female and 46 percent were male (data not shown). Figure 3.1 shows the population pyramid of the selected households. Female children under age 5 years were 10 percent and male children were 12 percent of the pyramid. Fifty-four percent of the population were under age 15. The proportions of populations above age 50 declines among both males and females.


Table 3.12 reports whether the surveyed households have access to electricity, have a separate room used for cooking, as well as the number of rooms that are used for sleeping. Overall 94 percent of the households had electricity. In the Far-western region, 86 percent of households had electricity as well as 79 percent among the lowest wealth quintile, and 83 percent among the Terai Dalit caste group. About four-fifths of the households ( 80 percent) had a separate room used for cooking. In the Far-western region, 73 percent had a separate room for cooking, as did 72 percent in the Mountain, 74 percent in urban areas, 63 percent among the lowest wealth quintile, 74 percent among the Hill Janajati caste group and 67 percent among the Hill Dalit caste group. The mean number of rooms used for sleeping was 2.4 with a standard deviation of 1.3. The range was 0 to 15 rooms. The mean number of rooms was 2.1 in the Mountain, 1.9 among the lowest wealth quintile, and 2.1 among the Hill Janajati caste group.

Table 3.13 shows the household possessions of selected assets including radio, television and mobile or landline phone. Phone possession has become virtually universal ( 94 percent) among the households as the means of communication. Almost three-fifths of the households own television ( 59 percent), and over a third own radio ( 36 percent). In the Mid-western and Farwestern regions, television possession was 37 percent and 30 percent, respectively; while in the Mountain it was 29 percent and among the second lowest and lowest wealth quintiles it was 37 percent and five percent, respectively.

Table 3.14 provides information on main materials used to construct the floor of the houses. More than half ( 53 percent) of the households had earth and sand as the floor material, and this was largely common ( $75-80$ percent) in the Mountain, Mid-western and Far-western regions, and the lowest and second lowest wealth quintiles (81-89 percent). A third of the households have cement as the floor material, 63 percent in the urban area, the fourth and highest wealth quintiles ( 69 and 81 percent, respectively), and the Newar caste group (69 percent).

### 3.4 Source of Drinking Water

Table 3.15 reports the main source of drinking water across various strata. About one-third of the households had piped water into their own premise, while one-fifth fetched water from the public tap or standpipe. Almost two-fifths ( 37 percent) used water from tube well or borehole, while five percent used water from other improved source ${ }^{4}$ such as protected well/spring and bottled water. Five percent use water from not improved sources (unprotected well/spring, tanker truck/cart with drum, surface water). Access to piped water on the premise was 52 percent in the Western region, 54 percent in the Hill, 52 percent among the highest wealth quintile, and around 51 percent for the Hill Brahmin and Newar ethnic caste groups. In the Terai, access to piped water was 14 percent as the majority of households ( 75 percent) are dependent on tube well or borehole as the main source of drinking water. Overall 60 percent of the households had access to an improved source of water ${ }^{4}$ within 30 minutes roundtrip ranging from 45 percent in the Western region to 71 percent in the Eastern region. Access to an improved source within 30 minutes of roundtrip was 38 percent in the Hill and 83 percent in the Terai. Further, it was 69 percent in the middle wealth quintile group and 96 percent among the Terai Dalit caste groups. Among those who treat water prior to drinking, over two-thirds (68 percent) used an appropriate method (boiling, bleaching, straining, filtering, and solar disinfection). Use of appropriate methods was 81 percent each in the Mid-western and the Western regions, 89 percent in the Mountains, 72 percent in the rural area and 95 percent and 91 percent, respectively, in the lowest and second lowest wealth quintiles.

### 3.5 Household Toilet Facility

Table 3.16 provides information on basic household sanitation, namely whether a household has a toilet facility and whether it is improved. About 85 percent of the households had an improved toilet facility ${ }^{5}$, while only one percent had not improved facility, and the remaining 14 percent had no toilet facility at all. Access to an improved toilet ${ }^{5}$ was 73 percent in the Terai, 53 percent among the other Terai caste, 47 percent among the Terai Dalit, and 57 percent among the Muslim group. Households with no toilet facility were 20 percent in the Central region, 26 percent in the Terai, and 23 percent among second lowest wealth quintile group. Over half of the Terai Dalit caste group did not have a toilet facility and neither did 47 percent of the other Terai caste group.

### 3.6 Observation of Hand washing Area and Cleaning Agents

Table 3.17 informs of another aspect of basic sanitation, namely whether the enumerators were able to observe the places where the household members most frequently washed their hands, and whether water and soap or other cleaning agent were present at those places at the time of the observation. The field teams were able to observe the place for washing hand in almost all

[^6]of the sampled households ( 99 percent). Among those observed, 84 percent had only water and 53 percent had soap or other detergent. More than half ( 53 percent) households observed had both water and soap or cleaning agent available at the time of observation. Availability of water at the place of hand washing ranged between 70-74 percent in the Mid-western region, Farwestern region, and the Mountain. It was 58 percent among the lowest wealth quintile and 65 percent among the Hill Dalit caste group. The availability of soap or cleaning agent by characteristics was similar to that of water, but the percentage were lower.

Among those observed, about a tenth had ash, mud or sand present at the place of hand washing. A significant 14 percent household observed had neither water nor soap or any other cleaning agent; highest among the lowest wealth quintile ( 35 percent) and Hill Dalit caste group (29 percent), and in the Mid-western, Far-western and Mountain ranging from 21-23 percent (Table 3.17).

### 3.7 Households Possessions of Mosquito Nets and Practice of Spraying against Mosquito

As Table 3.18 presents, over three-fourth households ( 76 percent) had mosquito nets, with a mean number of 2.7 nets. The mosquito-prone Terai region had the highest proportion (95 percent) of households possessing mosquito nets, while 62 percent and 40 percent in the Hill and Mountain respectively, had nets. Among the development regions, about four-fifths of the households in Eastern, Central and Western regions had nets while 60 percent in Mid-western and 51 percent in Far-western had nets. Only 44 percent in the lowest quintile and 53 percent of the Hill Dalit possess nets.

Four percent of the households that were mainly concentrated in the Terai (nine percent) and among several Terai castes ( $8-13$ percent) and in urban areas (seven percent) reported having the interior walls of their houses sprayed against mosquito by some external agent in the past 12 months prior to data collection (Table 3.19). Among those sprayed, the spraying was mainly (86 percent) conducted by the government worker/program (data not shown).

### 3.8 Households Possessions of Agriculture Land

Table 3.20 provides information on whether anyone in the household owns agricultural land, and the size of land owned by the household. Overall 71 percent of the households reported owing agricultural land with the mean size of 0.54 hectare. Agricultural land possession was higher among rural dwelling populations ( 75 percent) than among urban dwellers ( 47 percent), in Western region and Mid-western region (it was 79-82 percent) respectively. Eighty-two percent of households own land in the Mountain, while 74 percent in the Hill. The lowest, second lowest, and middle wealth quintiles owned between 75-79 percent each. Among the caste group, land ownership was 43 percent among the Newar ethnic group, 50 percent among the Terai Dalit, and 56 percent among the Muslim caste group. Among those who owned land, the average number of land owned was 0.66 hectare in the Eastern region, 0.73 hectare in Terai, 0.76 hectare among the fourth wealth quintile group and 1.79 hectare among the Muslim caste group.

### 3.9 Households Possessions of Livestock and other Farm Animals

Information on household ownership of livestock including other farm animals is shown in Table 3.21. Seventy-four percent of the households own some livestock, which ranged from 76-89 percent in all regions except Central ( 60 percent). In the Mountain, 90 percent of households own livestock, as did 80 percent of households in rural areas. Livestock ownership ranged from 81-83 percent among the Hill Chhetri, Hill Dalit and Terai Janajati caste group. Ownership of livestock decreases with increase in wealth quintile (91-86 percent among the lowest, second lowest and middle wealth quintiles, 68 percent among fourth and 35 percent among the highest wealth quintile). Among those who own livestock, the most common species owned were goats ( 70 percent), cows/bulls ( 57 percent), chickens/ducks ( 54 percent) and buffalo (44 percent). Less than one percent owned yaks or horses, donkeys and mules, while one percent owned sheep (data not shown).

### 3.10 Households Food Insecurity During Last 12 Months and Coping Strategies

As defined by FAO in 2002, food security is the situation when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. A household is considered food-secure when its occupants do not live in hunger or fear of starvation (Hunt, 2009). The government of Nepal through its constitution has also regarded food security as a fundamental human right and has accorded high priority to it through its constitutions and plans. Following NDHS 2011, the households are grouped into the following four food insecurity categories in relation to their response to a set of questions pertaining to their access to adequate food and food of their preference in the last 12 months.

- Food secure households: The households who did not experience any food insecurity conditions and rarely worried about such conditions.
- Mildly food insecure households: Those who worried about not having enough food sometimes or often, and/or were unable to eat preferred foods, and/or eat a more monotonous diet than desired and/or some foods considered undesirable but did so only rarely. They did not however cut back on quantity or experience any of the three most severe conditions, namely running out of food, going to bed hungry, or going a whole day and night without eating.
- Moderately food insecure households: Those who sacrificed quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or have rarely or sometimes started to cut back on quantity by reducing the size of meals or number of meals, but never experienced any of the three most severe conditions.
- Severely food insecure households: Those who had to cut back on meal size or number of meals often and/or had experienced any of the three most severe conditions, even if only rarely.

Table 3.22 describes the food insecurity status of the households in the last 12 months based on the above definitions. About 6 out of 10 households were food secure and 16 percent were mildly insecure. One quarter combined were either moderately insecure (18 percent) or severely insecure (seven percent) (Figure 3.2). In the Mountain region, 43 percent were food secure, 15 percent were severely food insecure, and almost a quarter of households were moderately insecure. In the Hill and Terai, about six in 10 people were food secure, while five and eight percent, respectively, were severely food insecure. In the Western region, 68 percent of households were food secure, while in the Central and Mid-western regions, 55 and 52 percent, respectively, were food secure. Rural areas were significantly more food insecure than the urban areas across all categories of food insecurity. Among the caste group, Muslim, Hill Dalit and Terai Dalit households suffered from severe food insecurity ranging from 12-16 percent, respectively.

Figure 3.2: Severity of Household Food Insecurity, Nepal National Micronutrient Status Survey, 2016


The households that suffered from food insecurity reported different strategies to address this problem. Figure 3.3 shows that among those households, 64 percent took a loan to cope with food insecurity. Over a quarter ( 26 percent) sold livestock, 12 percent consumed seed stocks held for next session, and 15 percent reported different coping strategies such as collection of wild food, selling assets or jewelry and selling land.

Figure 3.3: Coping Strategies among Food Insecure Households, Nepal National Micronutrient Status Survey, 2016


## List of Tables

For more information on the household and individual characteristics of the survey population, see the following tables:

Table 3.1: $\quad$ Selected Characteristics of Children 6-59 Months
Table 3.2: $\quad$ Selected Characteristics of Children 6-9 Years
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Table 3.6: $\quad$ Education Level of Children 6-9 Years
Table 3.7: Education Level of Adolescent Boys 10-19 Years
Table 3.8: $\quad$ Education Level of Adolescent Girls 10-19 Years
Table 3.9: Education Level of Women 15-49 Years
Table 3.10: Distribution by Sex and Age of Respondent to the Household Interview
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Table 3.18: Household Mosquito Net Ownership
Table 3.19: $\quad$ Spraying Interior Walls of House Against Mosquitos
Table 3.20: Household Ownership of Agricultural Land
Table 3.21: Household Ownership of Livestock, Herds and Other Farm Animals
Table 3.22: Household Food Insecurity During the Last 12 Months

Table 3.1: Selected Characteristics of Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016


Table 3.2: Selected Characteristics of Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Children 6-9 years |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |
| Eastern | 218 | 19.4 | (17.3-21.6) |  |
| Central | 227 | 37.9 | (33.8-42.1) |  |
| Western | 205 | 17.3 | (15.4-19.3) | $<0.001$ |
| Mid-western | 244 | 15.1 | (13.4-16.9) |  |
| Far-western | 244 | 10.4 | (9.2-11.8) |  |
| Ecological Region |  |  |  |  |
| Mountain | 177 | 7.3 | (6.4-8.4) |  |
| Hill | 476 | 40.4 | (36.9-43.9) | $<0.001$ |
| Terai | 485 | 52.3 | (48.7-55.9) |  |
| Location |  |  |  |  |
| Urban | 143 | 11.5 | (6.8-18.8) | 001 |
| Rural | 995 | 88.5 | (81.2-93.2) | , |
| Age |  |  |  |  |
| 6-7 | 528 | 48.8 | (46.0-51.5) | 0.013 |
| 8-9 | 610 | 51.2 | (48.5-54.0) | 0.013 |
| Sex |  |  |  |  |
| Male | 559 | 49.5 | (46.4-52.6) | 0.838 |
| Female | 579 | 50.5 | (47.4-53.6) | 0.838 |
| Wealth Quintile |  |  |  |  |
| Lowest | 328 | 23.8 | (20.2-27.8) |  |
| Second | 244 | 19.7 | (16.9-22.9) |  |
| Middle | 200 | 18.9 | (15.9-22.3) | 0.035 |
| Fourth | 203 | 20.5 | (17.2-24.4) |  |
| Highest | 163 | 17.1 | (13.1-22.0) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 110 | 9.3 | (7.1-12.1) |  |
| Hill Chhetri | 267 | 16.3 | (13.5-19.5) |  |
| Terai Brahmin/Chhetri | 30 | (2.8) | (1.5-4.9) |  |
| Other Terai Caste | 81 | 16.5 | (11.6-23.0) |  |
| Hill Dalit | 165 | 9.6 | (7.6-11.9) | <0.001 |
| Terai Dalit | 56 | 8.7 | (5.3-14.1) | <0.001 |
| Newar | 30 | (3.1) | (2.1-4.5) |  |
| Hill Janajati | 273 | 24.0 | (20.5-27.8) |  |
| Terai Janajati | 97 | 6.7 | (4.5-10.0) |  |
| Muslim | 28 | (3.0) | (1.6-5.5) |  |
| Total | 1,138 | 100.0 | - |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Non-parametric chi-square test. |  |  |  |  |

Table 3.3: Selected Characteristics of Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Adolescent Boys 10-19 years |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |
| Eastern | 208 | 22.7 | (20.0-25.6) |  |
| Central | 209 | 33.4 | (30.5-36.4) |  |
| Western | 195 | 19.9 | (18.3-21.6) | <0.001 |
| Mid-western | 199 | 12.9 | (11.5-14.6) |  |
| Far-western | 214 | 11.1 | (10.0-12.3) |  |
| Ecological Region |  |  |  |  |
| Mountain | 157 | 6.8 | (6.1-7.7) |  |
| Hill | 435 | 41.8 | (39.0-44.7) | <0.001 |
| Terai | 433 | 51.3 | (48.5-54.2) |  |
| Location |  |  |  |  |
| Urban | 143 | 13.8 | (8.6-21.4) |  |
| Rural | 882 | 86.2 | (78.6-91.4) | <0.001 |
| Age |  |  |  |  |
| 10-11 | 207 | 20.9 | (18.5-23.6) |  |
| 12-13 | 265 | 24.4 | (21.9-27.2) |  |
| 14-15 | 238 | 22.5 | (19.5-25.9) | <0.001 |
| 16-17 | 165 | 15.8 | (13.2-18.7) |  |
| 18-19 | 150 | 16.3 | (13.7-19.4) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 252 | 18.6 | (16.1-21.3) |  |
| Second | 211 | 20.3 | (17.4-23.4) |  |
| Middle | 209 | 22.1 | (18.6-26.2) | 0.059 |
| Fourth | 165 | 17.5 | (15.2-20.0) |  |
| Highest | 188 | 21.5 | (17.7-26.0) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 137 | 11.9 | (9.4-14.9) |  |
| Hill Chhetri | 267 | 20.0 | (17.0-23.4) |  |
| Terai Brahmin/Chhetri | 32 | (3.8) | (1.9-7.4) |  |
| Other Terai Caste | 70 | 13.1 | (9.6-17.6) |  |
| Hill Dalit | 121 | 7.7 | (6.0-9.9) |  |
| Terai Dalit | 38 | (6.7) | (3.7-11.8) | <0.001 |
| Newar | 37 | (4.4) | (2.9-6.5) |  |
| Hill Janajati | 211 | 20.5 | (16.8-24.8) |  |
| Terai Janajati | 90 | 9.0 | (6.0-13.4) |  |
| Muslim | 22 | * | * |  |
| Marital Status |  |  |  |  |
| Married | 26 | (2.5) | (1.4-4.3) |  |
| Never married | 995 | 97.2 | (95.4-98.3) | <0.001 |
| Living together | 3 | * | * |  |
| Separated | 1 | * | * |  |
|  | 1,025 | 100.0 | - |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Non-parametric chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c I Includes tho }}$ tho have completed 6-9 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 3.4: Selected Characteristics of Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Adolescent Girls 10-19 years |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |
| Eastern | 357 | 22.5 | (20.4-24.8) |  |
| Central | 357 | 32.2 | (29.7-34.9) |  |
| Western | 353 | 20.1 | (17.9-22.6) | $<0.001$ |
| Mid-western | 383 | 13.8 | (12.3-15.4) |  |
| Far-western | 415 | 11.3 | (10.1-12.7) |  |
| Ecological Region |  |  |  |  |
| Mountain | 291 | 7.4 | (6.4-8.6) |  |
| Hill | 782 | 43.7 | (41.1-46.3) | <0.001 |
| Terai | 792 | 48.9 | (46.3-51.6) |  |
| Location |  |  |  |  |
| Urban | 216 | 10.1 | (6.2-16.0) | 0.001 |
| Rural | 1,649 | 89.9 | (84.0-93.8) | 0.001 |
| Age |  |  |  |  |
| 10-11 | 343 | 18.1 | (16.1-20.2) |  |
| 12-13 | 444 | 24.2 | (22.0-26.5) |  |
| 14-15 | 404 | 22.6 | (20.7-24.6) | $<0.001$ |
| 16-17 | 330 | 16.8 | (14.8-19.0) |  |
| 18-19 | 344 | 18.4 | (16.7-20.3) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 494 | 22.7 | (20.2-25.4) |  |
| Second | 429 | 22.1 | (19.3-25.1) |  |
| Middle | 338 | 20.0 | (17.3-22.9) | $<0.001$ |
| Fourth | 330 | 19.1 | (16.4-22.1) |  |
| Highest | 274 | 16.2 | (13.5-19.2) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 220 | 11.8 | (9.0-15.2) |  |
| Hill Chhetri | 446 | 18.2 | (15.4-21.5) |  |
| Terai Brahmin/Chhetri | 43 | (2.9) | (1.4-5.9) |  |
| Other Terai Caste | 128 | 11.9 | (8.8-15.9) |  |
| Hill Dalit | 234 | 9.1 | (7.1-11.4) | 0.001 |
| Terai Dalit | 94 | 7.6 | (4.9-11.7) | 0.001 |
| Newar | 58 | 3.5 | (2.2-5.6) |  |
| Hill Janajati | 419 | 23.6 | (19.8-27.8) |  |
| Terai Janajati | 186 | 9.2 | (6.3-13.2) |  |
| Muslim | 37 | (2.3) | (1.2-4.4) |  |
| Marital Status |  |  |  |  |
| Married | 199 | 11.1 | (9.4-13.0) | <0.001 |
| Never married | 1,666 | 88.9 | (87.0-90.6) | <0.001 |
| Pregnancy Status |  |  |  |  |
| Pregnant | 12 | * | * |  |
| Not-pregnant | 1,850 | 99.3 | - | - |
| Don't know | 3 | * | * |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |
| Yes | 82 | 92.5 | (89.3-94.8) |  |
| No | 7 | * | * |  |
| Total | 1,865 | 100.0 | - |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be inter An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has Sample size might vary slightly due to missing data. P-value obtained from Non-parametric chi-square test. | eted with | tion. <br> d. |  |  |

Table 3.5: Selected Characteristics of Reproductive Age Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Women of Reproductive Age (15-49 years) |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) |  |
| Developmental Region Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 472 \\ & 473 \\ & 465 \\ & 475 \\ & 466 \end{aligned}$ | $\begin{array}{r} 22.9 \\ 35.5 \\ 19.2 \\ 13.3 \\ 9.2 \end{array}$ | $\begin{array}{r} (20.8-25.0) \\ (33.0-38.1) \\ (17.4-21.1) \\ (12.0-14.6) \\ (8.3-10.1) \end{array}$ | $<0.001$ |
| Ecological Region Mountain Hill <br> Terai | $\begin{aligned} & 381 \\ & 984 \\ & 986 \end{aligned}$ | $\begin{array}{r} 6.1 \\ 42.9 \\ 51.0 \\ \hline \end{array}$ | $\begin{array}{r} (5.4-6.9) \\ (40.4-45.3) \\ (48.6-53.5) \end{array}$ | <0.001 |
| Location Urban Rural | $\begin{array}{r} 322 \\ 2,029 \\ \hline \end{array}$ | $\begin{aligned} & 13.4 \\ & 86.6 \end{aligned}$ | $\begin{aligned} & (11.8-15.2) \\ & (84.8-88.2) \\ & \hline \end{aligned}$ | <0.001 |
| $\begin{array}{\|c} \hline \text { Age, years } \\ 15-19 \\ 20-29 \\ 30-39 \\ 40-49 \end{array}$ | $\begin{array}{r} 273 \\ 1,003 \\ 696 \\ 379 \end{array}$ | $\begin{aligned} & 10.5 \\ & 43.4 \\ & 30.5 \\ & 15.7 \end{aligned}$ | $\begin{gathered} (9.1-12.0) \\ (41.0-45.9) \\ (28.2-32.8) \\ (13.9-17.5) \end{gathered}$ | $<0.001$ |
| Marital Status <br> Never married <br> Married <br> Living together <br> Divorced/Separated <br> Widowed | $\begin{array}{r} 302 \\ 2,010 \\ 4 \\ 7 \\ 28 \end{array}$ | 13.0 85.5 $*$ $*$ $(1.0)$ | $\begin{array}{r} (11.3-14.7) \\ (83.8-87.1) \\ * \\ * \\ (0.7-1.6) \end{array}$ | $<0.001$ |
| Pregnancy Status <br> Pregnant <br> Non-pregnant | $\begin{array}{r} 207 \\ 2,144 \\ \hline \end{array}$ | $\begin{array}{r} 8.8 \\ 91.2 \\ \hline \end{array}$ | $\begin{array}{r} (7.5-10.2) \\ (89.5-82.5) \\ \hline \end{array}$ | <0.001 |
| Trimester of Pregnancy (among pregnant women) <br> First trimester <br> Second trimester <br> Third trimester | $\begin{aligned} & 57 \\ & 75 \\ & 75 \\ & \hline \end{aligned}$ | $\begin{aligned} & 25.9 \\ & 36.9 \\ & 37.2 \end{aligned}$ | $\begin{aligned} & (19.6-33.4) \\ & (29.5-44.9) \\ & (29.8-45.3) \\ & \hline \end{aligned}$ | 0.029 |
| Lactating Status (among those who had given birth in the last 5 years) Yes <br> No | $\begin{aligned} & 595 \\ & 235 \end{aligned}$ | $\begin{aligned} & 69.5 \\ & 30.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & (65.5-73.3) \\ & (26.8-34.4) \end{aligned}$ | <0.001 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 297 \\ 565 \\ 64 \\ 156 \\ 295 \\ 106 \\ 80 \\ 528 \\ 210 \\ 48 \\ \hline \end{array}$ | $\begin{array}{r} 13.6 \\ 18.7 \\ 3.8 \\ 10.7 \\ 8.8 \\ 6.9 \\ 4.7 \\ 21.4 \\ 9.4 \\ (2.1) \\ \hline \end{array}$ | $\begin{array}{r} (12.0-15.4) \\ (16.9-20.6) \\ (2.8-4.9) \\ (9.1-12.5) \\ (7.7-10.0) \\ (5.6-8.4) \\ (3.6-6.0) \\ (19.5-23.5) \\ (8.0-10.9) \\ (1.6-2.9) \\ \hline \end{array}$ | $<0.001$ |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 531 \\ & 491 \\ & 456 \\ & 454 \\ & 419 \\ & \hline \end{aligned}$ | $\begin{aligned} & 15.5 \\ & 18.8 \\ & 20.2 \\ & 21.3 \\ & 24.2 \\ & \hline \end{aligned}$ | $\begin{aligned} & (14.1-17.1) \\ & (17.0-20.7) \\ & (18.3-22.3) \\ & (19.3-23.4) \\ & (21.9-26.6) \\ & \hline \end{aligned}$ | <0.001 |
| Total | 2,351 | 100.0 | - |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Non-parametric chi-square test.

Table 3.6: Education Level of Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No Education ${ }^{\text {a }}$ |  |  | Primary ${ }^{\text {b }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 217 | 3.1 | (1.8-5.3) |  | 96.5 | (94.1-97.9) |  |
| Central | 226 | 4.7 | (1.4-15.1) |  | 95.3 | (84.9-98.6) |  |
| Western | 205 | 4.5 | (1.8-10.7) | 0.314 | 95.5 | (89.3-98.2) | 0.299 |
| Mid-western | 244 | 5.1 | (2.3-11.2) |  | 94.3 | (88.4-97.3) |  |
| Far-western | 244 | 0.6 | (0.1-2.8) |  | 99.4 | (97.2-99.9) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 177 | 0.0 | - |  | 99.4 | (95.5-99.9) |  |
| Hill | 476 | 1.1 | (0.6-2.2) | <0.001 | 98.6 | (97.4-99.2) | <0.001 |
| Terai | 483 | 6.8 | (3.5-12.9) |  | 93.2 | (87.1-96.5) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 141 | 4.4 | (1.2-14.9) |  | 94.9 | (85.3-98.4) |  |
| Rural | 995 | 4.0 | (2.0-7.6) | 0.684 | 95.9 | (92.3-97.9) | 0.712 |
| Age, years |  |  |  |  |  |  |  |
| 6 | 260 | 9.6 | (5.2-17.3) |  | 90.4 | (82.7-94.8) |  |
| 7 | 268 | 4.6 | (1.4-14.0) | <0.001 | 95.4 | (86.0-98.6) | 0.001 |
| 8 | 335 | 1.3 | (0.6-2.8) | <0.001 | 98.7 | (97.2-99.4) | 0.001 |
| 9 | 273 | 0.8 | (0.2-3.2) |  | 98.4 | (96.1-99.4) |  |
| Sex |  |  |  |  |  |  |  |
| Male | 559 | 3.4 | (1.7-6.6) | 0.248 | 96.5 | (93.2-98.2) | 256 |
| Female | 577 | 4.7 | (2.4-8.8) | 0.248 | 95.2 | (91.1-97.4) | . 256 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 328 | 5.6 | (2.6-11.9) |  | 94.2 | (88.0-97.3) |  |
| Second | 244 | 5.3 | (1.4-18.4) |  | 94.5 | (81.7-98.5) |  |
| Middle | 199 | 1.2 | (0.5-2.9) | 0.001 | 98.8 | (97.1-99.5) | 0.003 |
| Fourth | 203 | 6.6 | (3.2-13.1) |  | 93.4 | (86.9-96.8) |  |
| Highest | 162 | 0.1 | (0.0-1.2) |  | 99.4 | (97.0-99.9) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 0.0 | - |  | 100.0 | (0.0-100.0) |  |
| Hill Chhetri | 267 | 0.3 | (0.0-2.4) |  | 99.7 | (97.6-100.0) |  |
| Terai Brahmin/Chhetri | 29 | (7.7) | (1.9-26.9) |  | (92.3) | (73.1-98.1) |  |
| Other Terai caste | 80 | 12.1 | (4.0-31.0) |  | 87.9 | (69.0-96.0) |  |
| Hill Dalit | 165 | 2.0 | (0.6-6.3) | <0.001 | 98.0 | (93.7-99.4) | <0.001 |
| Terai Dalit | 56 | 8.1 | (2.6-22.2) | <0.001 | 91.9 | (77.8-97.4) | <0.001 |
| Newar | 30 | (0.8) | (0.1-6.5) |  | (99.2) | (93.5-99.9) |  |
| Hill Janajati | 273 | 1.3 | (0.6-2.7) |  | 98.4 | (96.9-99.2) |  |
| Terai Janajati | 97 | 1.0 | (0.1-7.6) |  | 99.0 | (92.4-99.9) |  |
| Muslim | 28 | (15.7) | (7.2-30.9) |  | (81.6) | (65.8-91.1) |  |
|  | 1,136 | 4.0 | (2.2-7.2) |  | 95.8 | (92.6-97.7) |  |

[^7]Table 3.7: Education Level of Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No Education ${ }^{\text {a }}$ |  |  | Primary ${ }^{\text {b }}$ |  |  | Some Secondary ${ }^{\text {c }}$ |  |  | SLC and Above ${ }^{\text {d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 208 | 0.4 | (0.1-3.2) |  |  | (28.4-42.3) |  | 49.5 | (44.3-54.6) |  | 15.1 | (10.9-20.5) |  |
| Central | 209 | 0.8 | (0.1-5.6) |  | 34.3 | (27.2-42.3) |  | 46.8 | (39.5-54.3) |  | 18.0 | (12.4-25.4) |  |
| Western | 195 | 1.8 | (0.5-6.7) | 0.365 | 23.0 | (17.7-29.3) | 0.046 | 57.9 | (49.6-65.9) | 0.080 | 17.2 | (12.8-22.8) | 0.166 |
| Mid-western | 199 | 0.6 | (0.1-4.1) |  | 33.8 | (26.4-42.1) |  | 52.0 | (44.2-59.6) |  | 13.6 | (9.0-20.1) |  |
| Far-western | 214 | 0.0 | - |  | 33.7 | (27.9-40.1) |  | 57.5 | (51.4-63.4) |  | 8.8 | (5.3-14.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 157 | 0.0 | (0.0-0.1) |  | 27.4 | (20.6-35.3) |  | 62.8 | (53.0-71.7) |  | 9.8 | (6.3-14.9) |  |
| Hill | 435 | 0.3 | (0.3-0.3) | 0.119 | 26.3 | (22.6-30.4) | 0.001 | 54.8 | (50.5-59.0) | 0.011 | 18.6 | (14.3-23.8) | 0.053 |
| Terai | 433 | 1.3 | (0.4-4.0) |  | 37.5 | (31.9-43.4) |  | 47.3 | (41.6-53.0) |  | 13.9 | (10.7-18.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 0.0 | - | 0.255 | 29.5 | (22.3-37.9) |  | 46.4 | (39.0-53.8) |  | 24.1 | (16.3-34.1) |  |
| Rural | 882 | 0.9 | (0.4-2.4) | 0.255 | 32.5 | (28.9-36.4) | . 488 | 52.3 | (48.3-56.3) | 0.196 | 14.2 | (11.6-17.4) | 0.003 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 207 | 0.0 | - |  | 81.0 | (75.3-85.6) |  | 19.0 | (14.4-24.7) |  | 0.0 | - |  |
| 12-13 | 265 | 2.0 | (0.6-6.5) |  | 41.9 | (34.6-49.6) |  | 56.1 | (48.9-63.0) |  | 0.0 | - |  |
| 14-15 | 238 | 0.3 | (0.0-2.4) | 0.138 | 11.7 | (7.5-17.7) | $<0.001$ | 82.6 | (76.0-87.7) | <0.001 | 5.4 | (2.7-10.5) | <0.001 |
| 16-17 | 165 | 0.8 | (0.1-5.5) |  | 4.2 | (1.2-14.3) |  | 64.0 | (56.2-71.2) |  | 31.0 | (25.3-37.2) |  |
| 18-19 | 150 | 0.7 | (0.1-5.2) |  | 9.9 | (4.5-20.5) |  | 31.2 | (23.6-39.9) |  | 58.2 | (47.0-68.6) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 252 | 0.9 | (0.2-3.6) |  |  | (37.2-47.9) |  | 51.6 | (46.4-56.8) |  | 5.0 | (2.9-8.5) |  |
| Second | 211 | 2.6 | (0.6-9.6) |  | 36.7 | (29.3-44.7) |  | 51.2 | (43.4-58.9) |  | 9.6 | (6.7-13.6) |  |
| Middle | 209 | 0.5 | (0.4-0.7) | 0.029 | 32.0 | (25.8-38.9) | $<0.001$ | 56.8 | (50.1-63.3) | 0.067 | 10.6 | (7.0-15.8) | $<0.001$ |
| Fourth | 165 | 0.0 | - |  | 28.8 | (22.5-36.0) |  | 54.6 | (47.0-62.0) |  | 16.6 | (10.2-26.0) |  |
| Highest | 188 | 0.0 | - |  | 21.6 | (14.6-30.8) |  | 43.7 | (35.4-52.3) |  | 34.7 | (26.9-43.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 1.0 | (0.8-1.3) |  |  | (19.7-32.9) |  | 53.0 | (44.2-61.5) |  | 20.2 | (15.3-26.3) |  |
| Hill Chhetri | 267 | 0.0 | - |  | 21.3 | (16.7-26.7) |  | 57.8 | (51.3-64.0) |  | 20.9 | (15.3-28.0) |  |
|  | 32 | (0.0) | - |  | (27.0) | (7.6-62.3) |  | (33.3) | (16.8-55.1) |  | (39.8) | (21.8-61.0) |  |
| Brahmin/Chhetri |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Other Terai caste | 70 | 0.9 | (0.1-7.0) |  | 43.3 | (30.2-57.4) |  | 45.6 | (29.0-63.3) |  | 10.2 | (4.5-21.6) |  |
| Hill Dalit | 121 | 0.0 | - | <0.001 | 35.4 | (27.0-44.7) | $<0.001$ | 58.7 | (48.5-68.1) | 0.001 | 6.0 | (2.5-13.5) | $<0.001$ |
| Terai Dalit | 38 | (6.7) | (2.2-18.3) |  | (52.1) | (34.1-69.6) |  | (31.8) | (15.9-53.4) |  | (9.4) | (2.1-33.1) |  |
| Newar | 37 | (0.0) | - |  | (13.1) | (4.6-32.4) |  | (47.1) | (36.1-58.4) |  | (39.8) | (21.7-61.2) |  |
| Hill Janajati | 211 |  | (0.0-0.0) |  | 31.2 | (26.5-36.2) |  | 57.9 | (52.4-63.2) |  | 10.9 | (7.3-16.2) |  |
| Terai Janajati | 90 | 1.3 | (0.2-9.3) |  | 34.4 | (23.0-48.0) |  | 52.2 | (41.3-62.8) |  | 12.1 | (6.2-22.1) |  |
| Muslim | 22 | * | * |  | * | * |  | * | * |  | * | * |  |
| Total | 1,025 | 0.8 | (0.3-2.1) |  | 32.1 | (28.8-35.6) |  | 51.5 | (48.0-54.9) |  | 15.6 | (13.0-18.6) |  |

[^8]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {I I Includes tho }}$ those have completed 6-9 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 3.8: Education Level of Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No Education ${ }^{\text {a }}$ |  |  | Primary ${ }^{\text {b }}$ |  |  | Some Secondary ${ }^{\text {c }}$ |  |  | SLC and Above ${ }^{\text {d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 356 |  | (1.3-7.7) |  | 30.7 | (24.8-37.3) |  | 51.6 | (42.8-60.4) |  | 14.5 | (11.3-18.5) |  |
| Central | 357 |  | (3.6-18.5) |  | 31.8 | (25.3-39.1) |  | 43.3 | (35.4-51.5) |  | 16.5 | (13.0-20.7) |  |
| Western | 353 | 3.2 | (1.9-5.6) | <0.001 | 20.3 | (14.8-27.1) | 0.001 | 58.7 | (50.3-66.6) | 0.000 | 17.8 | (11.4-26.7) | 0.035 |
| Mid-western | 383 |  | (1.0-10.7) |  | 32.4 | (27.5-37.8) |  | 53.9 | (47.1-60.6) |  | 10.3 | (6.3-16.3) |  |
| Far-western | 415 | 0.8 | (0.2-2.4) |  | 31.6 | (27.2-36.5) |  | 56.3 | (52.3-60.1) |  | 11.3 | (7.9-16.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 291 | 0.0 |  |  | 29.1 | (22.8-36.4) |  | 58.1 | (49.9-65.9) |  | 12.7 | (9.0-17.7) |  |
| Hill | 782 | 0.8 | (0.5-1.4) | <0.001 | 23.3 | (20.5-26.4) | <0.001 | 57.8 | (53.8-61.7) | 0.000 | 18.0 | (14.5-22.2) | 0.003 |
| Terai | 791 | 8.8 | (4.9-15.2) |  | 34.7 | (29.2-40.5) |  | 44.2 | (37.3-51.4) |  | 12.3 | (9.6-15.8) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 216 |  | (1.5-16.0) |  | 20.5 | (13.2-30.3) |  | 57.6 | (49.4-65.3) |  | 16.8 | (12.7-21.9) |  |
| Rural | 1648 | 4.6 | (2.5-8.2) | 0.669 | 30.3 | (27.1-33.7) | 0.006 | 50.5 | (46.3-54.6) | 0.070 | 14.6 | (12.3-17.4) | 0.400 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 343 | 0.6 | (0.1-4.3) |  | 83.7 | (78.7-87.8) |  | 15.7 | (12.1-20.1) |  | - | - |  |
| 12-13 | 445 | 5.4 | (2.3-11.8) | <0.001 | 34.0 | (28.4-40.2) | <0.001 | 59.6 | (52.4-66.4) | 0.000 | 1.0 | (0.4-2.7) |  |
| 14-15 | 404 | 4.6 | (1.7-11.7) | <0.001 | 13.6 | (10.7-17.1) | <0.001 | 76.0 | (69.4-81.6) | 0.000 | 5.8 | (4.2-8.0) | <0.001 |
| 16-17 | 329 | 3.6 | (1.7-7.6) |  | 6.2 | (4.0-9.6) |  | 57.8 | (50.9-64.4) |  | 32.3 | (26.3-39.0) |  |
| 18-19 | 343 | 8.7 | (5.2-14.2) |  | 9.7 | (6.8-13.8) |  | 38.5 | (32.2-45.2) |  | 43.2 | (36.8-49.8) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 82 | 11.6 | (5.4-23.1) |  | 22.6 | (13.1-36.1) |  | 49.8 | (37.8-61.8) |  | 16.0 | (8.3-28.6) |  |
| No | 7 | * |  | 0.345 | * |  | 0.557 | * |  | 0.976 | * |  | 0.882 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 494 | 4.4 | (2.3-8.1) |  | 39.0 | (35.0-43.1) |  | 51.5 | (47.4-55.5) |  | 5.2 | (3.5-7.6) |  |
| Second | 429 | 7.6 | (3.8-14.8) |  | 29.6 | (24.0-36.0) |  | 51.0 | (44.7-57.2) |  | 11.8 | (9.5-14.6) |  |
| Middle | 337 | 5.8 | (2.2-14.1) | 0.001 | 25.8 | (20.3-32.1) | $<0.001$ | 56.6 | (48.5-64.3) | 0.133 | 11.9 | (8.8-16.0) | <0.001 |
| Fourth | 330 | 3.8 | (2.1-6.8) |  | 27.5 | (20.8-35.4) |  | 49.2 | (42.1-56.4) |  | 19.5 | (13.8-26.7) |  |
| Highest | 274 | 0.5 | (0.1-4.0) |  | 21.7 | (17.1-27.2) |  | 46.8 | (39.5-54.3) |  | 30.9 | (24.7-37.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 220 | 0.0 | - |  | 13.6 | (9.1-19.9) |  | 51.4 | (44.3-58.5) |  | 35.0 | (28.7-41.8) |  |
| Hill Chhetri | 446 |  | (0.1-1.3) |  | 23.6 | (20.0-27.8) |  | 57.7 | (52.4-62.8) |  | 18.3 | (14.1-23.5) |  |
| Terai Brahmin/Chhetri | 43 | (0.0) |  |  | (24.9) | (16.2-36.2) |  | (58.2) | (46.6-69.0) |  | (16.9) | (9.3-28.7) |  |
| Other Terai caste | 128 | 17.5 | (7.6-35.4) |  | 38.0 | (27.8-49.4) |  | 37.6 | (26.3-50.5) |  | 6.9 | (3.2-14.6) |  |
| Hill Dalit | 234 | 4.1 | (2.1-7.9) |  | 34.9 | (27.4-43.2) | <0.001 | 51.4 | (43.3-59.5) | 0.000 | 9.6 | (5.3-16.9) | <0.001 |
| Terai Dalit | 92 | 16.7 | (9.7-27.2) |  | 54.3 | (38.7-69.1) |  | 24.2 | (11.9-43.0) |  | 4.8 | (2.5-8.9) |  |
| Newar | 58 | 0.0 |  |  | 20.0 | (10.5-34.7) |  | 58.5 | (45.7-70.3) |  | 21.5 | (13.3-32.9) |  |
| Hill Janajati | 419 |  | (0.2-2.1) |  |  | (25.1-33.7) |  |  | (53.1-63.0) |  | 11.9 | (9.8-14.4) |  |
| Terai Janajati | 187 | 2.7 | (0.4-15.6) |  | 23.3 | (13.5-37.3) |  | 61.3 | (48.6-72.7) |  | 12.7 | (7.7-20.3) |  |
| Muslim | 37 | (21.1) | (6.1-52.6) |  | (51.9) | (28.3-74.6) |  | (21.8) | (8.2-46.5) |  | (5.2) | (0.7-28.6) |  |
| Total | 1,864 | 4.6 | (2.7-7.9) |  | 29.3 | (26.3-32.5) |  | 51.2 | (47.2-55.1) |  | 14.9 | (12.7-17.3) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Includes those who have never attended school. <br> ${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school. <br> ${ }^{\text {c }}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 3.9: Education Level of Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No Education ${ }^{\text {a }}$ |  |  | Primary ${ }^{\text {b }}$ |  |  | Some Secondary ${ }^{\text {c }}$ |  |  | SLC and Above ${ }^{\text {d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{array}{r} \mathbf{p -} \\ \text { value } \end{array}$ | \% | (95\% CI) | $\begin{array}{r} \mathbf{p -} \\ \text { value } \end{array}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{array}{r} \mathbf{p}- \\ \text { value } \end{array}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 472 | 2.2 | (1.0-4.8) |  | 14.7 | (11.4-18.8) |  | 29.9 | (25.2-34.9) |  | 53.2 | (47.9-58.4) |  |
| Central | 473 | 0.4 | (0.1-1.4) |  | 15.6 | (12.4-19.6) |  | 19.6 | (15.9-23.9) |  | 64.3 | (59.4-68.9) |  |
| Western | 465 | 0.8 | (0.2-2.4) | 0.010 | 18.7 | (15.1-23.0) | 0.118 | 33.3 | (28.5-38.5) | <0.001 | 47.2 | (42.0-52.5) | <0.001 |
| Mid-western | 475 | 0.7 | (0.2-2.0) |  | 18.1 | (14.7-22.0) |  | 25.6 | (21.7-29.9) |  | 55.7 | (50.9-60.3) |  |
| Far-western | 466 | 1.4 | (0.7-3.1) |  | 11.5 | (8.8-14.9) |  | 27.8 | (23.7-32.2) |  | 59.3 | (54.5-63.8) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 381 | 0.5 | (0.1-3.5) |  | 14.6 | (11.0-19.2) |  | 21.3 | (17.0-26.3) |  | 63.6 | (57.9-69.0) |  |
| Hill | 984 | 0.8 | (0.4-1.7) | 0.526 | 17.1 | (14.4-20.1) | 0.457 | 28.5 | (25.2-32.0) | 0.060 | 53.6 | (49.8-57.4) | 0.012 |
| Terai | 986 | 1.3 | (0.6-2.4) |  | 15.2 | (12.9-17.9) |  | 24.7 | (21.8-27.9) |  | 58.8 | (55.3-62.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 322 | 1.5 | (0.5-3.9) | 0.286 | 12.8 | (9.1-17.6) | 0.090 | 25.1 | (19.8-31.2) | 0.652 | 60.7 | (54.2-66.9) | 0.147 |
| Rural | 2,029 | 1.0 | (0.5-1.6) | 0.286 | 16.5 | (14.6-18.5) | 0.090 | 26.3 | (24.0-28.7) | 0.652 | 56.3 | (53.6-58.9) | 0.147 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 273 | 0.0 | - |  | 8.9 | (5.4-14.2) |  | 58.7 | (51.4-65.6) |  | 32.5 | (25.9-39.8) |  |
| 20-29 | 1,003 | 0.9 | (0.4-2.2) | 0.246 | 14.4 | (12.1-17.1) | 000 | 29.2 | $(25.8-32.8)$ | 000 | 55.5 | (51.7-59.2) | <0.001 |
| 30-39 | 696 | 1.4 | (0.7-2.8) | 0.246 | 19.6 | (16.2-23.4) | , 000 | 19.3 | $(15.9-23.2)$ | 000 | 59.7 | (55.2-64.1) | <0.001 |
| 40-49 | 379 | 1.2 | (0.5-3.3) |  | 18.0 | (13.4-23.7) |  | 9.2 | (6.0-13.7) |  | 71.6 | (65.4-77.1) |  |
| Pregnant |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 207 | 2.4 | (0.8-6.4) | 0.037 | 20.9 | (15.0-28.3) | 0.047 | 27.5 | (21.1-35.0) |  | 49.3 | (41.4-57.2) |  |
| Non-pregnant | 2,144 | 0.9 | (0.5-1.5) | 0.037 | 15.5 | (13.7-17.4) | 0.047 | 26.0 | (23.8-28.3) | 0.626 | 57.6 | (55.0-60.2) | 0.021 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 531 | 0.9 | (0.3-2.9) |  | 19.7 | (15.7-24.3) |  | 22.0 | (18.1-26.4) |  | 57.4 | (52.3-62.4) |  |
| Second | 491 | 0.8 | (0.3-2.3) |  | 17.5 | (13.8-21.8) |  | 23.7 | (19.5-28.5) |  | 58.0 | (52.7-63.2) |  |
| Middle | 456 | 1.9 | (0.7-4.6) | 0.169 | 14.9 | (11.5-19.0) | 0.044 | 28.3 | (23.7-33.4) | 0.103 | 55.0 | (49.6-60.3) | 0.208 |
| Fourth | 454 | 1.2 | (0.5-2.7) |  | 16.8 | (13.1-21.1) |  | 28.6 | (23.8-33.8) |  | 53.5 | (48.0-58.9) |  |
| Highest | 419 | 0.4 | (0.1-2.1) |  | 12.7 | (9.2-17.2) |  | 26.7 | (22-32.1) |  | 60.2 | (54.5-65.7) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 297 | 0.0 | - |  | 11.5 | (7.8-16.8) |  | 27.9 | (22.2-34.5) |  | 60.6 | (53.7-67.0) |  |
| Hill Chhetri | 565 | 0.6 | (0.2-2.4) |  | 15.4 | (11.8-20) |  | 27.7 | (23.1-32.9) |  | 56.2 | (50.7-61.6) |  |
| Terai Brahmin/ Chhetri | 64 | 0.4 | (0.1-3.0) |  | 14.6 | (7.0-28.0) |  | 27.7 | (16.8-42.2) |  | 57.3 | (43.0-70.4) |  |
| Other Terai caste | 156 | 0.0 | - |  | 11.9 | (7.6-18.2) |  | 17.0 | (11.6-24.2) |  | 71.1 | (63.0-78.0) |  |
| Hill Dalit | 295 | 1.8 | (0.7-4.2) | 0.007 | 21.5 | (16.4-27.8) | 0.023 | 29.9 | (23.9-36.7) | 0.001 | 46.8 | (39.9-53.8) | <0.001 |
| Terai Dalit | 106 | 3.6 | (1.3-9.5) |  | 16.9 | (10.5-25.9) |  | 17.2 | (10.7-26.3) |  | 62.4 | (52.1-71.7) |  |
| Newar | 80 | 1.7 | (0.2-11.2) |  | 16.2 | (9.2-27.2) |  | 19.9 | (11.8-31.7) |  | 62.1 | (49.4-73.3) |  |
| Hill Janajati | 528 | 0.7 | (0.3-2.1) |  | 19.7 | (15.9-24.1) |  | 30.3 | (25.8-35.3) |  | 49.2 | (44.0-54.4) |  |
| Terai Janajati | 210 | 2.4 | (0.6-8.3) |  | 13.3 | (8.7-20.0) |  | 28.9 | (22.0-36.8) |  | 55.5 | (47.3-63.3) |  |
| Muslim | 48 | (1.4) | (0.2-9.6) |  | (18.3) | (10-31.1) |  | (15.8) | (7.2-31.3) |  | (64.4) | (49.2-77.2) |  |
| Total | 2,351 | 1.0 | (0.6-1.7) |  | 16.0 | (14.3-17.8) |  | 26.1 | (24.0-28.4) |  | 56.9 | (54.4-59.3) |  |

[^9]Table 3.10: Distribution by Sex and Age of Respondent to the Household Interview, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Households | Female respondent for household questionnaire |  |  | Age of respondent for household questionnaire ${ }^{\text {a }}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | (95\% CI) | $\begin{gathered} \mathbf{P}- \\ \text { value } \end{gathered}$ | Mean | SD | Minimum | Maximum |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 24.1 | 61.0 | (57.3-64.6) |  | 42.3 | 13.7 | 13 | 87 |
| Central | 862 | 34.6 | 70.4 | (67.0-73.6) |  | 39.1 | 13.5 | 13 | 80 |
| Western | 859 | 19.8 | 75.7 | (72.3-78.8) | $<0.001$ | 40.3 | 13.8 | 14 | 81 |
| Mid-western | 862 | 13.1 | 64.9 | (61.5-68.1) |  | 39.1 | 14.3 | 13 | 90 |
| Far-western | 862 | 8.5 | 68.8 | (65.6-71.9) |  | 40.0 | 14.3 | 17 | 86 |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 7.0 | 67.5 | (63.6-71.2) |  | 40.2 | 14.5 | 15 | 87 |
| Hill | 1,794 | 45.4 | 71.3 | (68.8-73.7) |  | 39.9 | 14.3 | 13 | 90 |
| Terai | 1,796 | 47.6 | 65.6 | (63.1-68.1) |  | 40.4 | 13.3 | 13 | 86 |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 13.9 | 72.5 | (68.0-76.6) | 0.019 | 39.5 | 13.5 | 18 | 86 |
| Rural | 3,711 | 86.1 | 67.7 | (65.8-69.4) | 0.015 | 40.3 | 13.9 | 13 | 90 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 20.0 | 66.4 | (63.0-69.6) |  | 40.7 | 14.7 | 13 | 90 |
| Second | 902 | 20.0 | 66.0 | (62.3-69.6) |  | 41.9 | 14.4 | 14 | 86 |
| Middle | 813 | 20.0 | 66.8 | (62.9-70.5) | 0.007 | 40.9 | 13.6 | 15 | 83 |
| Fourth | 789 | 20.0 | 69.4 | (65.5-73.1) |  | 38.0 | 13.6 | 13 | 80 |
| Highest | 650 | 20.0 | 73.1 | (68.9-76.9) |  | 39.4 | 12.6 | 17 | 80 |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 13.4 | 71.7 | (67.0-75.9) |  | 43.1 | 13.8 | 15 | 84 |
| Hill Chhetri | 1,045 | 19.4 | 73.4 | (70.0-76.5) |  | 40.1 | 14.4 | 13 | 85 |
| Terai Brahmin/Chhetri | 111 | 3.1 | 61.4 | (50.5-71.3) |  | 41.7 | 12.1 | 19 | 72 |
| Other Terai Caste | 291 | 10.4 | 60.3 | (54.2-66.1) |  | 40.0 | 12.8 | 17 | 80 |
| Hill Dalit | 510 | 8.2 | 75.9 | (71.4-79.9) | $<0.001$ | 37.0 | 13.5 | 13 | 80 |
| Terai Dalit | 183 | 6.0 | 59.3 | (51.5-66.7) | -0.001 | 39.7 | 14.4 | 13 | 75 |
| Newar | 152 | 5.3 | 74.3 | (66.0-81.2) |  | 40.5 | 14.0 | 18 | 80 |
| Hill Janajati | 1,027 | 24.3 | 69.3 | (65.8-72.6) |  | 40.0 | 14.3 | 15 | 90 |
| Terai Janajati | 354 | 7.8 | 61.8 | (55.7-67.5) |  | 39.2 | 11.8 | 18 | 76 |
| Muslim | 80 | 1.9 | 41.7 | (30.2-54.2) |  | 40.0 | 14.8 | 18 | 75 |
| Total | 4,309 | 100.0 | 68.3 | (66.6-70.0) |  | 40.2 | 13.8 | 13 | 90 |

[^10]Table 3.11: Number of Persons Living in the Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | 1-3 persons |  |  | 4-6 persons |  |  | 7-10 persons |  |  | ${ }^{10+}$ persons |  |  | Mean(SD) number of persons |  | Min-Max number of persons |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | P-value | \% | (95\% CI) | P-value | \% | (95\% CI) | P-value | \% | (95\% CI) | P-value | Mean | SD | Minimum | Maximum |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 35.3 | (31.8-38.9) |  | 51.7 | (48.0-55.4) |  | 12.2 | (10.0-14.9) |  | 0.7 | (0.3-1.8) |  | 4.4 | 2.0 | 1.0 | 17.0 |
| Central | 862 | 29.4 | (26.1-32.8) |  | 54.3 | (50.6-57.9) |  | 13.3 | (11.1-16.0) |  | 3.0 | (2.0-4.6) |  | 4.8 | 2.3 | 1.0 | 17.0 |
| Western | 859 | 32.2 | (28.6-35.9) | 0.001 | 55.0 | (51.1-58.8) | 0.500 | 12.0 | (9.7-14.6) | 0.008 | 0.9 | (0.5-1.7) | <0.001 | 4.5 | 2.0 | 1.0 | 17.0 |
| Mid-western | 862 | 29.9 | (26.9-33.1) |  | 56.0 | (52.5-59.3) |  | 12.2 | (10.1-14.6) |  | 1.9 | (1.2-3.1) |  | 4.6 | 2.1 | 1.0 | 15.0 |
| Far-western | 862 | 24.1 | (21.4-27.2) |  | 54.0 | (50.6-57.4) |  | 19.1 | (16.6-21.9) |  | 2.7 | (1.8-4.0) |  | 5.1 | 2.4 | 1.0 | 22.0 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 33.9 | (30.1-37.9) |  | 54.4 | (50.2-58.4) |  | 11.0 | (8.8-13.8) |  | 0.7 | (0.3-1.9) |  | 4.4 | 1.9 | 1.0 | 14.0 |
| Hill | 1,794 | 35.5 | (32.8-38.2) | <0.001 | 52.7 | (50.0-55.5) | 0.305 | 10.6 | (9.1-12.3) | $<0.001$ | 1.2 | (0.7-1.9) | <0.001 | 4.3 | 1.9 | 1.0 | 19.0 |
| Terai | 1,796 | 26.2 | (24.0-28.6) |  | 55.1 | (52.5-57.7) |  | 15.9 | (14.0-17.9) |  | 2.8 | (2-3.8.0) |  | 4.9 | 2.3 | 1.0 | 22.0 |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 35.1 | (30.7-39.8) | 0.019 | 51.4 | (46.6-56.1) | 0.171 | 12.1 | (9.4-15.6) | 0.450 | 1.4 | (0.6-3.2) | 0.293 | 4.4 | 2.1 | 1.0 | 17.0 |
| Rural | 3,711 | 30.3 | (28.5-32.1) |  | 54.4 | (52.5-56.4) |  | 13.3 | (12.1-14.7) |  | 2.0 | (1.5-2.6) |  | 4.7 | 2.2 | 1.0 | 22.0 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 32.9 | (29.7-36.3) |  | 53.0 | (49.5-56.5) |  | 12.7 | (10.7-15.0) |  | 1.4 | (0.8-2.4) |  | 4.5 | 2.1 | 1.0 | 15.0 |
| Second | 902 | 30.3 | (26.9-33.9) |  | 54.5 | (50.6-58.3) |  | 13.5 | (11.0-16.3) |  | 1.8 | (0.9-3.4) |  | 4.6 | 2.1 | 1.0 | 19.0 |
| Middle | 813 | 26.5 | (23.1-30.3) | 0.020 | 55.5 | (51.5-59.5) | 0.850 | 14.9 | (12.3-18.0) | 0.442 | 3.0 | (1.9-4.9) | 0.094 | 4.9 | 2.3 | 1.0 | 22.0 |
| Fourth | 789 | 32.7 | (28.8-36.8) |  | 53.5 | (49.3-57.6) |  | 12.4 | (9.9-15.4) |  | 1.5 | (0.8-2.8) |  | 4.5 | 2.1 | 1.0 | 17.0 |
| Highest | 650 | 32.5 | (28.4-36.9) |  | 53.5 | (49.0-58.0) |  | 12.2 | (9.6-15.4) |  | 1.8 | (1.0-3.3) |  | 4.6 | 2.2 | 1.0 | 17.0 |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 35.4 | (30.9-40.3) |  | 56.2 | (51.2-61.0) |  | 8.2 | (5.9-11.3) |  | 0.2 | (0.1-0.6) |  | 4.2 | 1.8 | 1.0 | 12.0 |
| Hill Chhetri | 1,045 | 37.3 | (33.7-41.2) |  | 51.4 | (47.5-55.2) |  | 10.4 | (8.4-12.8) |  | 0.8 | (0.5-1.4) |  | 4.3 | 1.9 | 1.0 | 19.0 |
| Terai Brahmin/Chhetri | 111 | 25.0 | (17.0-35.3) |  | 60.2 | (49.4-70.2) |  | 12.6 | (7.0-21.6) |  | 2.1 | (0.4-10) |  | 4.9 | 2.1 | 1.0 | 12.0 |
| Other Terai Caste | 291 | 16.6 | (12.5-21.8) |  | 52.7 | (46.7-58.7) |  | 25.2 | (20.3-30.9) |  | 5.4 | (3.2-9.0) |  | 5.8 | 2.7 | 1.0 | 17.0 |
| Hill Dalit | 510 | 28.5 | (24.0-33.4) |  | 57.7 | (52.5-62.7) |  | 13.1 | (10.0-16.9) |  | 0.8 | (0.4-1.6) |  | 4.6 | 1.9 | 1.0 | 14.0 |
| Terai Dalit | 183 | 19.2 | (13.8-26.1) |  | 55.6 | (47.8-63.1) | 0.003 | 20.9 | (15.3-27.8) | <0.00 | 4.3 | (2-9.1.0) | <0.001 | 5.3 | 2.6 | 1.0 | 16.0 |
| Newar | 152 | 40.5 | (31.8-49.8) |  | 50.1 | (41.0-59.2) |  | 9.4 | (5.5-15.7) |  | 0.0 | - |  | 4.2 | 1.8 | 1.0 | 10.0 |
| Hill Janajati | 1,027 | 35.4 | (31.8-39.0) |  | 52.8 | (49.0-56.5) |  | 10.1 | (8.2-12.5) |  | 1.8 | (0.9-3.3) |  | 4.4 | 2.0 | 1.0 | 13.0 |
| Terai Janajati | 354 | 24.1 | (19.2-29.8) |  | 61.4 | (55.4-67.1) |  | 12.9 | (9.4-17.5) |  | 1.5 | (0.8-2.9) |  | 4.7 | 2.0 | 1.0 | 22.0 |
| Muslim | 80 | 15.7 | (7.7-29.1) |  | 37.5 | (26.6-49.9) |  | 36.3 | (25.3-48.8) |  | 10.5 | (5.4-19.5) |  | 6.6 | 2.9 | 1.0 | 15.0 |
| Total | 4,309 | 31.0 | (29.3-32.7) |  | 54.0 | (52.2-55.8) |  | 13.1 | (12.0-14.4) |  | 1.9 | (1.5-2.5) |  | 4.6 | 2.2 | 1.0 | 22.0 |

Sample size might vary slightly due to missing data. Number of persons in the household defined as those
migrated and will not return for at least six months.

Table 3.12: Selected Housing Characteristics, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Have Electricity ${ }^{\text {a }}$ |  |  | Separate room used for cooking |  |  | Mean(SD) number of rooms used for sleeping |  | Min-Max, number of rooms for sleeping |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | (95\% CI) | $\begin{gathered} \mathbf{P}- \\ \text { value } \end{gathered}$ |  | (95\% CI) | $\begin{gathered} P- \\ \text { value } \end{gathered}$ | Mean | SD | Minimum | Maximum |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 92.5 | (90.4-94.2) |  | 80.1 | (77.1-82.7) |  |  |  | 0.0 | 10.0 |
| Central | 862 | 97.4 | (96.0-98.3) |  |  | (75.9-81.8) |  | 2.3 |  | 1.0 | 15.0 |
| Western | 859 | 96.2 | (94.6-97.3) | $<0.001$ |  | (81.9-87.4) | $<0.001$ | 2.4 |  | 1.0 | 11.0 |
| Mid-western | 862 | 91.8 | (89.7-93.5) |  | 80.8 | (78.0-83.4) |  | 2.4 |  | 1.0 | 8.0 |
| Far-western | 862 | 86.3 | (83.8-88.4) |  | 73.0 | (69.9-75.8) |  | 2.4 | 1.2 | 1.0 | 8.0 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 92.5 | (90.2-94.4) |  |  | (67.8-75.2) |  |  |  | 1.0 | 11.0 |
| Hill | 1,794 | 95.5 | (94.6-96.3) | 0.007 | 76.2 | (73.8-78.4) | <0.001 | 2.3 |  | 0.0 | 10.0 |
| Terai | 1,796 | 93.4 | (92.0-94.6) |  | 85.1 | (83.2-86.9) |  | 2.5 | 1.3 | 1.0 | 15.0 |
| Location |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 97.3 | (95.4-98.5) |  |  | (70.0-78.5) |  |  |  | 1.0 | 10.0 |
| Rural | 3,711 | 93.8 | (92.9-94.6) | 0.001 | 81.0 | (79.5-82.5) |  | 2.4 | 1.3 | 0.0 | 15.0 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 78.9 | (76.0-81.6) |  | 63.0 | (59.6-66.2) |  | 1.9 |  | 0.0 | 7.0 |
| Second | 902 | 94.7 | (92.8-96.1) |  | 81.3 | (78.1-84.1) |  | 2.2 |  | 1.0 | 7.0 |
| Middle | 813 | 98.5 | (97.0-99.3) | $<0.001$ | 86.7 | (83.7-89.3) | $<0.001$ | 2.5 |  | 1.0 | 8.0 |
| Fourth | 789 | 99.3 | (98.2-99.8) |  | 81.1 | (77.5-84.3) |  | 2.5 |  | 1.0 | 15.0 |
| Highest | 650 | 100.0 | - |  | 88.6 | (85.4-91.1) |  | 2.7 |  | 1.0 | 10.0 |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 97.6 | (96.5-98.4) |  | 86.9 | (83.2-89.9) |  |  |  | 1.0 | 10.0 |
| Hill Chhetri | 1,045 | 95.5 | (94.1-96.6) |  |  | (82.3-87.1) |  | 2.5 |  | 1.0 | 10.0 |
| Terai Brahmin/Chhetri | 111 | 99.2 | (97.0-99.8) |  |  | (83.5-95.6) |  | 2.9 |  | 1.0 | 8.0 |
| Other Terai Caste | 291 | 90.8 | (87.0-93.6) |  | 79.7 | (74.5-84.1) |  | 2.5 |  | 1.0 | 15.0 |
| Hill Dalit | 510 | 90.3 | (87.6-92.5) |  |  | (62.2-71.7) |  | 2.0 |  | 1.0 | 6.0 |
| Terai Dalit | 183 | 82.9 | (76.2-88.0) | <0.001 |  | (70.8-83.4) | <0.001 | 2.3 |  | 1.0 | 7.0 |
| Newar | 152 | 98.7 | (93.3-99.8) |  | 81.1 | (73.1-87.2) |  | 2.2 |  | 1.0 | 6.0 |
| Hill Janajati | 1,027 | 95.8 | (94.3-96.9) |  | 73.6 | (70.2-76.7) |  | 2.1 |  | 0.0 | 11.0 |
| Terai Janajati | 354 | 93.0 | (89.1-95.5) |  | 87.2 | (82.6-90.7) |  | 2.4 |  | 1.0 | 8.0 |
| Muslim | 80 | 98.1 | (92.5-99.5) |  | 82.1 | (69.1-90.4) |  | 2.4 |  | 1.0 | 6.0 |
| Total | 4,309 | 94.3 | (93.5-95.0) |  | 80.1 | (78.7-81.5) |  | 2.4 |  | 0.0 | 15.0 |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Electricity includes line from main grid or solar. |  |  |  |  |  |  |  |  |  |  |  |

Table 3.13: Households Having Radio, TV, Mobile/Landline Phone, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Have Radio |  |  | Have TV |  |  | Have Mobile/Landline phone |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 37.1 | (33.8-40.5) |  | 58.2 | (50.9-65.2) |  | 93.5 | (89.9-95.9) |  |
| Central | 862 | 36.2 | (32.9-39.7) |  | 67.9 | (63.6-72.0) |  | 95.3 | (93.9-96.4) |  |
| Western | 859 | 40.5 | (37.6-43.4) | 0.003 | 69.9 | (65.2-74.2) | $<0.001$ | 96.4 | (94.3-97.8) | $<0.001$ |
| Mid-western | 862 | 30.3 | (26.1-34.8) |  | 36.8 | (30.1-44.1) |  | 90.8 | (87.3-93.4) |  |
| Far-western | 862 | 34.9 | (31.4-38.5) |  | 29.7 | (23.6-36.8) |  | 89.9 | (85.8-92.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 41.1 | (37.1-45.2) |  | 28.9 | (23.5-35.0) |  | 91.0 | (86.3-94.3) |  |
| Hill | 1,794 | 40.4 | (38.2-42.7) | <0.001 | 55.2 | (50.8-59.6) | $<0.001$ | 94.5 | (93.3-95.5) | 0.063 |
| Terai | 1,796 | 31.9 | (29.4-34.5) |  | 66.3 | (61.8-70.5) |  | 94.1 | (92.0-95.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 32.1 | (27.0-37.8) | 0.019 | 84.1 | (78.6-88.4) | <0.001 | 96.1 | (94.4-97.3) | 019 |
| Rural | 3,711 | 37.1 | (35.1-39.1) | . 019 | 54.6 | (50.4-58.6) | . | 93.7 | (92.4-94.8) | 0.019 |
| Sex of Household Head |  |  |  |  |  |  |  |  |  |  |
| Male | 1,369 | 37.4 | (35.1-39.8) |  | 55.6 | (51.7-59.5) |  | 92.6 | (90.7-94.2) |  |
| Female | 2,940 | 35.9 | (34.1-37.8) | 53 | 60.1 | (56.9-63.2) | . 06 | 94.7 | (93.6-95.6) | 0.007 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 25.3 | (22.6-28.3) |  | 4.7 | (3.3-6.5) |  | 80.1 | (76.5-83.3) |  |
| Second | 902 | 38.8 | (36.0-41.6) |  | 37.1 | (33.3-41.0) |  | 94.7 | (91.9-96.6) |  |
| Middle | 813 | 39.6 | (35.8-43.6) | $<0.001$ | 69.6 | (64.5-74.2) | $<0.001$ | 97.7 | (96.2-98.6) | $<0.001$ |
| Fourth | 789 | 37.7 | (35.0-40.4) |  | 83.2 | (79.2-86.5) |  | 98.3 | (96.5-99.2) |  |
| Highest | 650 | 40.5 | (35.1-46.2) |  | 98.8 | (98.0-99.3) |  | 99.4 | (98.0-99.8) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 47.5 | (43.0-52.0) |  | 72.9 | (67.4-77.8) |  | 97.4 | (95.1-98.6) |  |
| Hill Chhetri | 1,045 | 40.8 | (36.6-45.2) |  | 56.5 | (49.4-63.3) |  | 95.8 | (93.9-97.2) |  |
| Terai Brahmin/Chhetri | 111 | 34.9 | (27.1-43.6) |  | 77.4 | (58.8-89.2) |  | 98.0 | (92.5-99.5) |  |
| Other Terai caste | 291 | 30.3 | (24.3-37.1) |  | 65.3 | (57.2-72.5) |  | 93.7 | (89.3-96.3) |  |
| Hill Dalit | 510 | 30.4 | (26.1-35.1) | <0.001 | 42.3 | (36.0-48.8) | <0.001 | 91.2 | (87.5-93.9) | <0.001 |
| Terai Dalit | 183 | 28.7 | (23.0-35.1) | <0.001 | 45.9 | (33.3-58.9) | <0.001 | 86.1 | (78.3-91.4) | <0.001 |
| Newar | 152 | 38.8 | (30.7-47.5) |  | 87.8 | (76.4-94.1) |  | 96.2 | (92.3-98.2) |  |
| Hill Janajati | 1,027 | 35.2 | (32.3-38.2) |  | 49.1 | (45.3-52.9) |  | 92.7 | (90.9-94.2) |  |
| Terai Janajati | 354 | 32.1 | (25.4-39.7) |  | 58.3 | (48.4-67.6) |  | 95.4 | (91.6-97.5) |  |
| Muslim | 80 | 26.2 | (10.4-52.0) |  | 64.8 | (52.0-75.8) |  | 89.6 | (80.7-94.7) |  |
| Total | 4,309 | 36.4 | (34.7-38.1) |  | 58.7 | (55.8-61.5) |  | 94.0 | (92.9-95.0) |  |

[^11]Table 3.14: Main Materials to Construct the Floor, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Earth/sand |  |  | Cement |  |  | Dung |  |  | Other ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | pvalue |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 58.6 | (54.8-62.3) |  | 29.8 | (26.3-33.5) |  | 8.9 | (7.1-11.2) |  | 2.7 | (1.5-4.6) |  |
| Central | 862 | 36.3 | (32.9-39.8) |  | 41.0 | (37.5-44.7) |  | 14.2 | (11.8-16.9) |  | 8.5 | (5.6-12.7) |  |
| Western | 859 | 52.3 | (48.5-56.2) | $<0.010$ | 40.4 | (36.8-44.2) | $<0.001$ | 5.7 | (4.1-7.8) | <0.001 | 1.6 | (0.6-4.1) | $<0.001$ |
| Mid-western | 862 | 75.4 | (72.4-78.2) |  | 17.2 | (14.8-19.9) |  | 6.0 | (4.6-7.9) |  | 1.3 | (0.7-2.3) |  |
| Far-western | 862 | 77.1 | (74.2-79.9) |  | 21.2 | (18.5-24.1) |  | 1.6 | (0.9-2.7) |  | 0.1 | (0.0-1.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 79.7 | (76.1-82.9) |  | 8.3 | (6.3-11.0) |  | 6.5 | (4.7-9.0) |  | 5.4 | (4.0-7.4) |  |
| Hill | 1,794 | 55.3 | (52.4-58.1) | $<0.010$ | 30.4 | (27.7-33.2) | $<0.001$ | 9.1 | (7.6-11.0) | 0.285 | 5.3 | (3.1-8.7) | 0.082 |
| Terai | 1,796 | 47.8 | (45.2-50.5) |  | 40.0 | (37.4-42.6) |  | 9.5 | (8.0-11.2) |  | 2.7 | (1.9-3.9) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 24.2 | (20.3-28.4) | $<0.001$ | 63.0 | (58.3-67.4) | $<0.001$ | 4.2 | (2.8-6.3) | <0.001 | 8.7 | (4.7-15.5) | 0.563 |
| Rural | 3,711 | 58.2 | (56.2-60.1) | <0.001 | 28.6 | (26.8-30.5) | <0.001 | 9.9 | (8.7-11.2) | <0.001 | 3.3 | (2.0-5.5) | 0.563 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 88.7 | (85.7-91.2) |  | 0.0 | - |  | 11.3 | (8.8-14.3) |  | 0.0 | (0.0-0.0) |  |
| Second | 902 | 80.8 | (77.3-83.8) |  | 3.4 | (2.2-5.2) |  | 14.9 | (12.1-18.1) |  | 1.0 | (0.6-1.6) |  |
| Middle | 813 | 69.9 | (66.1-73.5) | $<0.001$ | 13.7 | (11.2-16.6) | $<0.001$ | 15.3 | (12.5-18.6) | <0.001 | 1.1 | (0.7-1.7) | $<0.001$ |
| Fourth | 789 | 25.3 | (21.9-29.1) |  | 68.8 | (64.8-72.5) |  | 4.0 | (2.6-6.0) |  | 1.9 | (1.1-3.3) |  |
| Highest | 650 | 2.4 | (1.4-4.4) |  | 81.2 | (77.3-84.5) |  | 0.0 | (0-0.2.0) |  | 16.3 | (11.3-23.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 42.0 | (37.3-46.8) |  | 44.5 | (39.6-49.4) |  | 4.3 | (2.7-6.8) |  | 9.2 | (5.8-14.4) |  |
| Hill Chhetri | 1,045 | 57.7 | (53.7-61.7) |  | 33.1 | (29.3-37.2) |  | 5.0 | (3.6-7.1) |  | 4.1 | (2.5-6.8) |  |
| Terai <br> Brahmin/Chhetri | 111 | 36.5 | (26.9-47.3) |  | 48.9 | (38.4-59.6) |  | 5.1 | (2.0-12.8) |  | 9.4 | (3.7-21.8) |  |
| Other Terai Caste | 291 | 48.1 | (42.1-54.2) |  | 32.4 | (27.0-38.4) |  | 18.7 | (14.3-23.9) |  | 0.8 | (0.2-3.2) |  |
| Hill Dalit | 510 | 66.5 | (61.2-71.5) | $<0.001$ | 23.3 | (19.0-28.2) | $<0.001$ | 8.0 | (5.4-11.7) | <0.001 | 2.1 | (1.0-4.6) | <0.001 |
| Terai Dalit | 183 | 70.0 | (62.4-76.7) |  | 16.3 | (11.4-22.8) |  | 13.6 | (9.0-20.1) |  | - | - |  |
| Newar | 152 | 19.6 | (13.5-27.6) |  | 68.5 | (59.8-76.1) |  | 2.2 | (0.9-5.6) |  | 9.6 | (5.8-15.6) |  |
| Hill Janajati | 1,027 | 57.4 | (53.6-61.1) |  | 26.3 | (22.9-29.8) |  | 13.0 | (10.5-15.9) |  | 3.4 | (2.1-5.5) |  |
| Terai Janajati | 354 | 59.7 | (53.6-65.5) |  | 30.6 | (25.3-36.4) |  | 8.3 | (5.5-12.4) |  | 1.4 | (0.4-5.0) |  |
| Muslim | 80 | 54.7 | (42.0-66.7) |  | 41.9 | (30.0-54.8) |  | 2.3 | (0.3-14.8) |  | 1.1 | (0.1-8.1) |  |
| Total | 4,309 | 53.4 | (51.6-55.2) |  | 33.4 | (31.7-35.2) |  | 9.1 | (8.1-10.3) |  | 4.1 | (2.9-5.6) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
"Other includes wood/planks, palm/bamboo, parquet or polished wood, vinyl or asphalt strips, ceramic tiles, or "other" to specify
Table 3.15: Main Source of Drinking Water, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Main source of drinking water |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Improved source and within 30 minutes round trip time to obtain water |  |  | Use appropriate method to treat water prior to drinking among those who treat water $^{\mathrm{c}}$ ( $\mathrm{N}=636$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Improved Sources |  |  |  |  |  |  |  |  |  |  |  | Non-improved sources ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
|  |  | Piped water into house/yard/plot |  |  | Public tap/standpipe |  |  | Tube well or borehole |  |  | Other improved source ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \\ \hline \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Developmental Region |  |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 | 76.7 $(61.1-87.3)$  <br> 52.0 $(41.1-62.7)$  <br> 80.6 $(67.1-89.5)$ $<0.001$ <br> 81.1 $(62.1-91.9)$  <br> 72.8 (55.5-85.2)  |  |  |
| Eastern | 864 | 25.5 | (22.8-28.4) |  | 9.4 | (7.8-11.3) |  | 59.6 | (56.1-63.0) |  | 3.2 | (2.0-4.9) |  |  | (1.6-4.0) |  | 71.3 | (67.0-75.3) |  |  |  |  |
| Central | 862 | 31.7 | (28.3-35.3) |  | 20.7 | (18.0-23.7) |  | 33.0 | (29.7-36.4) |  | 6.8 | (5.2-8.8) |  | 7.9 | (6.1-10.1) |  | 58.7 | (48.2-68.5) |  |  |  |  |
| Western | 859 | 52.0 | (48.1-55.8) |  | 21.7 | (18.5-25.2) |  | 19.5 | (17.0-22.3) |  | 3.4 | (2.2-5.3) |  | 3.4 | (2.2-5.3) |  | 44.5 | (33.0-56.5 |  |  |  |  |
| Mid-western | 862 | 32.2 | (29.1-35.5) |  | 29.7 | (26.6-32.9) |  | 31.3 | (28.2-34.5) |  | 3.4 | (2.3-4.8) |  | 3.9 | (2.8-5.5) |  | 61.2 | (54.1-67.9 |  |  |  |  |
| Far-western | 862 | 24.2 | (21.4-27.1) |  | 31.4 | (28.3-34.6) |  | 35.2 | (32.0-38.5) |  | 6.0 | (4.6-7.6) |  | 3.4 | (2.4-4.8) |  | 68.0 | (60.6-74.6 |  |  |  |  |
| Ecological Region |  |  |  | <0.001 |  |  | $<0.001$ |  |  | <0.001 |  |  | <0.001 |  |  | $<0.001$ |  |  | <0.001 | 89.2 $(83.5-93.2)$  <br> 63.1 $(57.2-68.6)$ $<0.001$ <br> 76.8 $(61.7-87.2)$  |  |  |
| Mountain | 719 | 38.7 | (34.9-42.8) |  | 51.0 | (46.9-55.1) |  | 0.1 | (0.0-0.9) |  | 2.6 | (1.5-4.5) |  | 8.0 | (6-10.6) |  | 48.3 | (42.1-54.6) |  |  |  |  |
| Hill | 1,794 | 53.6 | (50.9-56.4) |  | 29.9 | (27.5-32.4) |  | 2.5 | (1.9-3.2) |  | 7.7 | (6.3-9.3) |  | 6.4 | (5.1-8) |  | 37.6 | (32.2-43.3) |  |  |  |  |
| Terai | 1,796 | 13.8 | (12.3-15.5) |  | 6.5 | (5.4-7.9) |  | 74.7 | (72.4-76.8) |  | 2.2 | (1.5-3.2) |  | 2.9 | (2.1-4.1) |  | 83.2 | (75.2-89.0) |  |  |  |  |
| Location |  |  |  | 0.139 |  |  | <0.001 |  |  | 0.740 |  |  | <0.001 |  |  | 0.296 |  |  | 0.274 |  |  |  |
| Urban | 598 | 36.3 | (32.0-40.8) |  | 9.9 | (7.9-12.4) |  | 36.1 | (31.4-40.9) |  | 12.2 | (9.2-15.9) |  | 5.7 | (3.5-9) |  | 58.0 | (43.3-71.5) |  | 55.5 | (39.1-70.7) | <0.001 |
| Rural | 3,711 | 33.2 | (31.4-35.1) |  | 21.9 | (20.4-23.5) |  | 36.8 | (34.9-38.7) |  | 3.5 | (2.9-4.3) |  | 4.7 | (3.9-5.6) |  | 60.4 | (54.8-65.8) |  | 72.3 | (61.8-80.8) |  |
| Wealth Quintile |  |  |  | <0.001 |  |  | $<0.001$ |  |  | $<0.001$ |  |  | <0.001 |  |  | $<0.001$ |  |  | $<0.001$ |  |  | $<0.001$ |
| Lowest | 1,155 | 27.2 | (24.3-30.3) |  | 47.6 | (44.2-51.1) |  | 11.4 | (9.2-14.0) |  | 5.4 | (4.2-7.1) |  | 8.4 | (6.5-10.7) |  | 58.5 | (54.4-62.6) |  | 94.8 | (85.8-98.2) |  |
| Second | 902 | 35.1 | (31.6-38.7) |  | 25.6 | (22.3-29.1) |  | 33.1 | (29.5-36.9) |  | 2.7 | (1.7-4.4) |  | 3.7 | (2.4-5.5) |  | 60.3 | (55.3-65.2) |  | 91.1 | (86.9-94.0) |  |
| Middle | 813 | 25.7 | (22.4-29.2) |  | 15.1 | (12.4-18.2) |  | 52.1 | (48.1-56.1) |  | 2.6 | (1.6-4.3) |  | 4.7 | (3.2-6.8) |  | 69.2 | (63.2-74.6) |  | 84.1 | (75.7-90.0) |  |
| Fourth | 789 | 27.9 | (24.4-31.8) |  | 10.7 | (8.4-13.6) |  | 52.8 | (48.6-56.9) |  | 3.9 | (2.6-5.8) |  | 4.7 | (3.0-7.3) |  | 67.2 | (58.9-74.6) |  | 70.2 | (57.5-80.4) |  |
| Highest | 650 | 52.4 | (47.8-56.9) |  | 2.2 | (1.3-3.7) |  | 34.0 | (29.9-38.3) |  | 9.0 | (6.6-12) |  | 2.7 | (1.5-4.9) |  | 45.0 | (33.9-56.6) |  | 50.9 | (41.8-60.0) |  |
| Ethnicity |  |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |
| Hill Brahmin | 551 | 51.4 | (46.5-56.3) |  | 17.7 | (14.4-21.6) |  | 22.3 | (18.4-26.7) |  | 5.8 | (3.9-8.5) |  | 2.8 | (1.6-4.8) |  | 43.8 | (35.2-52.7) |  | 78.7 | (66.4-87.4) |  |
| Hill Chhetri | 1,045 | 47.5 | (43.6-51.4) |  | 26.4 | (23.4-29.7) |  | 17.3 | (14.6-20.3) |  | 3.3 | (2.3-4.8) |  | 5.9 | (4.2-8.2) |  | 44.8 | (38.2-51.6) |  | 57.1 | (41.9-71.0) |  |
| Terai Brahmin/Chhetri | 111 | 17.4 | (10.6-27.4) |  | 2.1 | (0.8-5.7) |  | 80.4 | (70.6-87.6) |  | 0.0 | - |  | 0.0 | - |  | 82.6 | (68.5-91.2) |  | 88.9 | (70.9-96.3) |  |
| Other Terai Caste | 291 | 2.0 | (0.9-4.4) |  | 2.4 | (1.1-5.0) |  | 92.6 | (88.8-95.2) |  | 0.0 | - |  | 3.0 | (1.4-6.1) |  | 95.0 | (82.2-98.7) |  | 79.5 | (47.5-94.3) |  |
| Hill Dalit | 510 | 29.2 | (24.6-34.3) |  | 40.4 | (35.5-45.4) |  | 14.7 | (11.4-18.8) |  | 9.1 | (6.4-12.8) |  | 6.8 | (4.6-10.1) |  | 59.0 | (52.3-65.4) |  | 80.0 | (66.1-89.2) |  |
| Terai Dalit | 183 | 2.0 | (0.8-5.3) |  | 2.0 | (0.8-5.1) |  | 92.9 | (88.0-95.9) |  | 1.6 | (0.5-5.5) |  | 1.4 | (0.4-5.5) |  | 95.8 | (85.1-98.9) |  | 87.4 | (43.6-98.4) |  |
| Newar | 152 | 51.6 | (42.4-60.6) |  | 12.6 | (7.9-19.5) |  | 8.7 | (5.0-14.7) |  | 20.1 | (13.5-28.8) |  | 7.1 | (3.4-14.1) |  | 41.1 | (29.9-53.4) |  | 41.7 | (27.6-57.3) |  |
| Hill Janajati | 1,027 | 45.3 | (41.6-49) |  | 32.1 | (28.7-35.7) |  | 10.2 | (8.2-12.7) |  | 5.6 | (4.1-7.5) |  | 6.9 | (5.1-9.2) |  | 46.2 | (40.4-52.0) |  | 72.3 | (64.9-78.5) |  |
| Terai Janajati | 354 | 5.9 | (4.0-8.6) |  | 6.4 | (4.0-10.2) |  | 85.0 | (80.3-88.7) |  | 0.8 | (0.2-3.5) |  | 2.0 | (0.7-5.3) |  | 92.4 | (84.6-96.5) |  | 82.6 | (58.5-94.1) |  |
| Muslim | 80 | 3.0 | (1.1-7.9) |  | 1.1 | (0.2-7.4) |  | 89.0 | (76.9-95.1) |  | 0.0 | - |  | 6.9 | (2.1-20.9) |  | 90.1 | (70.9-97.1) |  | 100.0 | (0.0-100.0) |  |
| Total | 4,309 | 33.6 | (32.0-35.4) |  | 20.2 | (18.9-21.7) |  | 36.7 | (34.9-38.4) |  | 4.7 | (4.0-5.6) |  | 4.8 | (4.1-5.7) |  | 60.1 | (55.4-64.5) |  | 68.3 | (62.2-73.9) |  |

Note: N unweighted. All estimates account for weighting and complex sample design Sample size might vary slightly due to missing data.
a'Other Improved sources: protected well/spring; rain water; bottled water. https://washdata.org/
${ }^{\text {a Other }}$
bNon-improved sources: protected well/spring; rain water; bottled water. https://washdata.or
bnprotected well/spring; tanker truck/cart with drum; surface water.
${ }^{\text {chap }}$ Appropriate treatment methods prior to drinking include boiling, bleaching, straining, filtering and solar disinfection.

Table 3.16: Household Toilet Facility, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Improved toilet facility, shared or not shared ${ }^{\text {a }}$ |  |  | Not improved toilet facility, shared or not shared ${ }^{\text {b }}$ |  |  | No toilet facility ${ }^{\text {c }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 82.9 | (79.7-85.8) |  | 1.8 | (1.1-3.1) |  | 15.2 | (12.5-18.4) |  |
| Central | 862 | 79.4 | (76.3-82.1) |  | 0.6 | (0.2-1.5) |  | 20.1 | (17.4-23) |  |
| Western | 859 | 90.8 | (88.6-92.6) | $<0.001$ | 0.9 | (0.4-2.2) | 0.064 | 8.3 | (6.6-10.3) | <0.001 |
| Mid-western | 862 | 89.4 | (87.1-91.3) |  | 1.2 | (0.7-2.2) |  | 9.4 | (7.6-11.5) |  |
| Far-western | 862 | 92.6 | (90.6-94.2) |  | 1.5 | (0.8-2.6) |  | 5.9 | (4.5-7.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 95.2 | (93.0-96.7) |  | 1.6 | (0.8-3.1) |  | 3.2 | (2.0-5.1) |  |
| Hill | 1,794 | 95.7 | (94.3-96.7) | <0.001 | 1.0 | (0.6-1.8) | 0.616 | 3.3 | (2.4-4.5) | $<0.001$ |
| Terai | 1,796 | 73.2 | (70.7-75.5) |  | 1.1 | (0.7-1.7) |  | 25.7 | (23.4-28.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 91.1 | (87.8-93.6) | <0.001 | 0.4 | (0.2-1.1) | 01 | 8.4 | (6.0-11.8) | 0.00 |
| Rural | 3,711 | 83.9 | (82.4-85.4) |  | 1.2 | (0.9-1.7) |  | 14.8 | (13.5-16.3) | 0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 82.4 | (79.2-85.3) |  | 2.0 | (1.2-3.4) |  |  | (12.9-18.7) |  |
| Second | 902 | 75.4 | (71.7-78.9) |  | 1.5 | (0.8-2.5) |  |  | (19.7-26.9) |  |
| Middle | 813 | 79.2 | (75.6-82.4) | $<0.001$ | 0.6 | (0.3-1.6) | 0.006 | 20.2 | (17.0-23.8) | $<0.001$ |
| Fourth | 789 | 88.3 | (85.4-90.8) |  | 1.3 | (0.6-2.7) |  | 10.4 | (8.1-13.2) |  |
| Highest | 650 | 99.2 | (98.3-99.6) |  | 0.2 | (0.0-1.4) |  | 0.6 | (0.3-1.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 97.5 | (95.4-98.7) |  | 1.1 | (0.4-3.1) |  | 1.4 | (0.6-3.0) |  |
| Hill Chhetri | 1,045 | 96.3 | (94.6-97.5) |  | 1.6 | (0.9-2.9) |  | 2.1 | (1.3-3.4) |  |
| Terai Brahmin/Chhetri | 111 | 75.7 | (64.9-84.0) |  | 0.0 | - |  | 24.3 | (16-35.1) |  |
| Other Terai Caste | 291 | 52.9 | (46.8-58.9) |  | 0.2 | (0.1-0.9) |  | 46.9 | (40.9-52.9) |  |
| Hill Dalit | 510 | 94.7 | (91.7-96.7) | <0.001 | 1.0 | (0.3-3.9) | 0.071 | 4.3 | (2.7-6.8) | <0.001 |
| Terai Dalit | 183 | 47.3 | (39.6-55.1) | <0.001 | 1.3 | (0.4-3.9) | 0.071 | 51.4 | (43.6-59.1) | <0.001 |
| Newar | 152 | 99.4 | (97.6-99.8) |  | 0.0 | - |  | 0.6 | (0.2-2.4) |  |
| Hill Janajati | 1,027 | 91.2 | (88.6-93.2) |  | 1.0 | (0.5-1.9) |  |  | (5.9-10.3) |  |
| Terai Janajati | 354 | 77.6 | (71.5-82.7) |  | 2.1 | (0.9-4.5) |  |  | (15.4-26.5) |  |
| Muslim | 80 | 57.0 | (44.9-68.4) |  | 3.9 | (1.1-13.1) |  | 39.0 | (28.3-50.9) |  |
| Total | 4,309 | 84.9 | (83.5-86.2) |  | 1.1 | (0.8-1.5) |  | 14.0 | (12.7-15.3) |  |

[^12]Table 3.17: Observation of Hand Washing Area, Water and Cleansing Agents, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Hand washing area observed $^{\text {a }}$ |  |  | Only Water present ${ }^{\text {b }}$ |  |  | Only Soap or detergent present ${ }^{\text {b }}$ |  |  | Both water and soap or detergent present ${ }^{\text {b }}$ |  |  | Ash, mud or sand present ${ }^{\text {b }}$ |  |  | No water, soap, detergent, ash, mud or sand ${ }^{\text {b }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  | 0.340 |  |  | $\begin{array}{r} <0.00 \\ 1 \end{array}$ |  |  | $<0.001$ |  |  | $<0.001$ |  |  | <0.001 |  |  | <0.001 |
| Eastern | 864 | 99.4 | (98.3-99.8) |  | 88.2 | (85.8-90.3) |  | 59.9 | (56.2-63.5) |  | 58.6 | (54.9-62.2) |  | 14.0 | (11.7-16.6) |  | 7.1 | (5.4-9.3) |  |
| Central | 862 | 99.3 | (98.1-99.7) |  | 83.1 | (80.3-85.7) |  | 57.3 | (53.7-60.8) |  | 57.1 | (53.5-60.7) |  | 4.0 | (2.8-5.6) |  | 16.5 | (14.0-19.3) |  |
| Western | 859 | 99.0 | (98.0-99.5) |  | 91.0 | (88.5-93.0) |  | 56.7 | (52.9-60.5) |  | 56.0 | (52.1-59.8) |  | 5.3 | (3.8-7.3) |  | 8.0 | (6.1-10.5) |  |
| Mid-western | 862 | 99.6 | (98.8-99.9) |  | 74.4 | (71.3-77.3) |  | 37.3 | (34-40.6) |  | 36.1 | (32.9-39.5) |  | 22.0 | (19.3-25) |  | 20.5 | (17.8-23.4) |  |
| Far-western | 862 | 99.9 | (99.0-100.0) |  | 73.5 | (70.4-76.3) |  | 34.3 | (31.1-37.6) |  | 33.7 | (30.6-37.0) |  | 10.7 | (8.7-12.9) |  | 22.9 | (20.2-25.8) |  |
| Ecological Region |  |  |  | 0.088 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 100.0 | (99.9-100.0) |  | 70.1 | (66.2-73.7) | $\begin{array}{r} <0.00 \\ 1 \end{array}$ | 36.3 | (32.5-40.4) | <0.001 | 35.1 | (31.3-39.1) | <0.001 | 13.9 | (11.4-16.8) | 0.024 | 23.4 | (20.1-27.1) | <0.001 |
| Hill | 1,794 | 99.5 | (98.7-99.8) |  | 79.9 | (77.7-81.9) |  | 55.9 | (53.1-58.6) |  | 55.2 | (52.5-57.9) |  | 9.5 | (8.2-11.0) |  | 17.0 | (15.1-19.0) |  |
| Terai | 1,796 | 99.1 | (98.5-99.5) |  | 89.9 | (88.1-91.4) |  | 53.2 | (50.5-55.8) |  | 52.5 | (49.8-55.1) |  | 9.0 | (7.7-10.6) |  | 9.0 | (7.5-10.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 99.6 | (98.1-99.9) | 0.329 | 92.9 | (90.2-94.8) | $<0.00$ | 76.6 | (72.5-80.3) | <0.001 | 76.1 | (72.0-79.8) | <0.001 | 4.4 | (2.9-6.6) | <0.001 | 5.9 | (4.1-8.5) | <0.001 |
| Rural | 3,711 | 99.3 | (98.8-99.6) |  | 82.5 | (81.0-83.9) | 1 | 49.4 | (47.5-51.4) |  | 48.7 | (46.7-50.6) |  | 10.4 | (9.4-11.5) |  | 14.9 | (13.6-16.3) |  |
| Wealth Quintile |  |  |  |  |  |  | $\begin{array}{r} <0.00 \\ 1 \end{array}$ |  |  | <0.001 |  |  | <0.001 |  |  | $<0.001$ |  |  | <0.001 |
| Lowest | 1,155 | 99.3 | (98.3-99.7) | 0.411 | 58.4 | (54.9-61.8) |  | 18.9 | (16.3-21.8) |  | 18.1 | (15.5-21.0) |  | 20.3 | (17.8-23.2) |  | 34.7 | (31.4-38.1) |  |
| Second | 902 | 99.7 | (98.8-99.9) |  | 81.5 | (78.2-84.4) |  | 41.8 | (38.1-45.6) |  | 40.6 | (36.9-44.4) |  | 11.8 | (9.7-14.3) |  | 15.9 | (13.1-19.1) |  |
| Middle | 813 | 99.7 | (98.6-99.9) |  | 87.1 | (84.1-89.6) |  | 48.3 | (44.3-52.3) |  | 47.3 | (43.3-51.4) |  | 10.3 | (8.1-12.9) |  | 11.4 | (9.0-14.4) |  |
| Fourth | 789 | 99.0 | (97.8-99.6) |  | 94.1 | (91.7-95.9) |  | 67.2 | (63.2-71.0) |  | 66.8 | (62.8-70.6) |  | 4.5 | (3.1-6.5) |  | 5.0 | (3.4-7.4) |  |
| Highest | 650 | 99.1 | (97.0-99.7) |  | 98.8 | (97.4-99.4) |  | 90.1 | (87.3-92.3) |  | 89.9 | (87.1-92.1) |  | 0.9 | (0.5-1.9) |  | 1.0 | (0.5-2.3) |  |
| Ethnicity |  |  |  | 0.001 |  |  | $\begin{array}{r} <0.00 \\ 1 \end{array}$ |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |  |  | <0.001 |
| Hill Brahmin | 551 | 99.8 | (99.3-100.0) |  | 90.1 | (87.0-92.5) |  | 68.5 | (63.9-72.7) |  | 67.9 | (63.3-72.2) |  | 5.7 | (4.0-7.9) |  | 8.4 | (6.2-11.3) |  |
| Hill Chhetri | 1,045 | 99.5 | (96.5-99.9) |  | 84.6 | (82.0-86.8) |  | 54.8 | (51.0-58.5) |  | 54.1 | (50.4-57.9) |  | 10.3 | (8.5-12.5) |  | 12.8 | (10.7-15.2) |  |
| Terai Brahmin/Chhetri | 111 | 97.2 | (89.6-99.3) |  | 97.1 | (89.3-99.3) |  | 62.9 | (52.0-72.6) |  | 62.9 | (52.0-72.6) |  | 15.2 | (9.0-24.3) |  | 2.9 | (0.7-10.7) |  |
| Other Terai Caste | 291 | 98.7 | (96.5-99.6) |  | 86.9 | (82.1-90.5) |  | 46.3 | (40.3-52.5) |  | 46.3 | (40.3-52.5) |  | 4.5 | (2.6-7.6) |  | 13.0 | (9.4-17.8) |  |
| Hill Dalit | 510 | 99.3 | (97.9-99.8) |  | 65.4 | (60.6-70.0) |  | 41.1 | (36.0-46.5) |  | 39.2 | (34.1-44.5) |  | 9.8 | (7.5-12.9) |  | 29.0 | (24.8-33.6) |  |
| Terai Dalit | 183 | 97.9 | (94.1-99.3) |  | 81.4 | (74.3-86.9) |  | 28.9 | (22.3-36.5) |  | 27.6 | (21.1-35.1) |  | 19.1 | (13.5-26.3) |  | 15.6 | (10.6-22.4) |  |
| Newar | 152 | 99.8 | (98.6-100.0) |  | 94.9 | (89.7-97.5) |  | 83.1 | (75.7-88.5) |  | 83.1 | (75.7-88.5) |  | 5.7 | (2.8-11.1) |  | 3.3 | (1.2-8.3) |  |
| Hill Janajati | 1,027 | 99.6 | (98.8-99.9) |  | 79.1 | (75.9-82.0) |  | 50.6 | (46.9-54.4) |  | 50.0 | (46.3-53.7) |  | 10.7 | (8.8-12.8) |  | 17.4 | (14.7-20.6) |  |
| Terai Janajati | 354 | 100.0 | - |  | 89.5 | (84.8-92.8) |  | 48.2 | (42.2-54.3) |  | 46.8 | (40.7-52.9) |  | 10.8 | (7.8-14.7) |  | 9.1 | (5.9-13.5) |  |
| Muslim | 80 | 99.2 | (94.3-99.9) |  | 93.0 | (80.8-97.6) |  | 48.9 | (36.7-61.3) |  | 48.9 | (36.7-61.3) |  | 9.9 | (5.5-17.1) |  | 7.0 | (2.4-19.2) |  |
| Total | 4,309 | 99.4 | (98.9-99.6) |  | 84.0 | (82.6-85.2) |  | 53.2 | (51.4-55.0) |  | 52.5 | (50.7-54.3) |  | 9.6 | (8.7-10.6) |  | 13.6 | (12.5-14.9) |  |

Sample size might vary slightly due to missing da
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ a Observed where household members most frequently wash their hands.

Table 3.18: Household Mosquito Net Ownership, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Household has any mosquito net to use while sleeping |  |  | Mosquito nets ${ }^{\text {a }}$ |  | Min - Max number of mosquito nets ${ }^{\text {a }}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | Mean | SD | Minimum | Maximum |
| Developmental Region |  |  |  |  |  |  |  |  |
| Eastern | 864 | 80.6 | (78.1-82.9) |  | 2.8 | 1.4 | 1.0 | 10.0 |
| Central | 862 | 82.1 | (79.0-84.8) |  | 2.6 | 1.4 | 1.0 | 10.0 |
| Western | 859 | 82.0 | (78.7-84.9) | <0.001 | 2.8 | 1.4 | 1.0 | 9.0 |
| Mid-western | 862 | 59.6 | (56.2-63.0) |  | 2.5 | 1.3 | 1.0 | 8.0 |
| Far-western | 862 | 51.4 | (48.0-54.8) |  | 3.0 | 1.5 | 1.0 | 12.0 |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 719 | 39.5 | (35.4-43.7) |  | 2.4 | 1.2 | 1.0 | 7.0 |
| Hill | 1,794 | 61.7 | (59.0-64.3) | <0.001 | 2.5 | 1.4 | 1.0 | 10.0 |
| Terai | 1,796 | 95.4 | (94.2-96.3) |  | 2.9 | 1.4 | 1.0 | 12.0 |
| Location |  |  |  |  |  |  |  |  |
| Urban | 598 | 82.9 | (78.7-86.3) | <0.001 | 2.6 | 1.3 | 1.0 | 8.0 |
| Rural | 3,711 | 75.1 | (73.5-76.6) | <0.001 | 2.7 | 1.4 | 1.0 | 12.0 |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 44.1 | (40.6-47.7) |  | 2.0 | 0.9 | 1.0 | 5.0 |
| Second | 902 | 75.9 | (72.8-78.8) |  | 2.4 | 1.2 | 1.0 | 7.0 |
| Middle | 813 | 90.0 | (87.4-92.1) | <0.001 | 2.8 | 1.3 | 1.0 | 12.0 |
| Fourth | 789 | 91.2 | (88.4-93.3) |  | 2.8 | 1.3 | 1.0 | 10.0 |
| Highest | 650 | 79.7 | (75.4-83.4) |  | 3.1 | 1.6 | 1.0 | 10.0 |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 81.2 | (77.2-84.7) |  | 3.2 | 1.7 | 1.0 | 10.0 |
| Hill Chhetri | 1,045 | 66.7 | (63.2-70.0) |  | 2.7 | 1.3 | 1.0 | 8.0 |
| Terai Brahmin/Chhetri | 111 | 95.3 | (88.1-98.2) |  | 2.7 | 1.4 | 1.0 | 8.0 |
| Other Terai Caste | 291 | 91.8 | (87.9-94.6) |  | 2.6 | 1.4 | 1.0 | 9.0 |
| Hill Dalit | 510 | 53.2 | (48.1-58.3) | <0.001 | 2.3 | 1.1 | 1.0 | 5.0 |
| Terai Dalit | 183 | 92.2 | (87.2-95.4) |  | 2.3 | 1.2 | 1.0 | 7.0 |
| Newar | 152 | 62.8 | (53.2-71.4) |  | 2.3 | 1.1 | 1.0 | 5.0 |
| Hill Janajati | 1,027 | 70.3 | (67.1-73.4) |  | 2.5 | 1.3 | 1.0 | 8.0 |
| Terai Janajati | 354 | 98.3 | (95.5-99.4) |  | 3.2 | 1.4 | 1.0 | 12.0 |
| Muslim | 80 | 88.4 | (78.4-94.1) |  | 2.7 | 1.4 | 1.0 | 7.0 |
|  | 4,309 | 76.2 | (74.7-77.6) |  | 2.7 | 1.4 | 1.0 | 12.0 |

[^13]Table 3.19: Spraying Interior Walls of House Against Mosquitos, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Interior walls of house sprayed in last 12 months against mosquitos |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 864 \\ & 862 \\ & 859 \\ & 862 \\ & 862 \end{aligned}$ | $\begin{aligned} & 6.1 \\ & 6.6 \\ & 0.2 \\ & 3.0 \\ & 0.3 \end{aligned}$ | $\begin{array}{r} (1.5-21.6) \\ (2.7-15.2) \\ (0.0-0.8) \\ (0.6-13.6) \\ (0.1-1.4) \\ \hline \end{array}$ | <0.001 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{array}{r} 719 \\ 1,794 \\ 1,796 \end{array}$ | $\begin{aligned} & 0.0 \\ & 0.1 \\ & 8.7 \end{aligned}$ | $\begin{array}{r} - \\ (0.0-0.9) \\ (4.3-16.9) \end{array}$ | <0.001 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 598 \\ 3,711 \end{array}$ | $\begin{aligned} & 7.1 \\ & 3.7 \end{aligned}$ | $\begin{array}{r} (2.2-20.9) \\ (1.5-8.9) \\ \hline \end{array}$ | <0.001 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{array}{r} 1,155 \\ 902 \\ 813 \\ 789 \\ 650 \\ \hline \end{array}$ | $\begin{aligned} & 0.4 \\ & 3.8 \\ & 5.4 \\ & 5.9 \\ & 5.5 \end{aligned}$ | $\begin{array}{r} (0.1-2.8) \\ (1.1-12.5) \\ (2.1-13.1) \\ (2.6-12.7) \\ (2.7-11.1) \\ \hline \end{array}$ | <0.001 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 551 \\ 1,045 \\ 111 \\ 291 \\ 510 \\ 183 \\ 152 \\ 1,027 \\ 354 \\ 80 \end{array}$ | $\begin{array}{r} 1.9 \\ 1.4 \\ 13.0 \\ 11.0 \\ 1.4 \\ 8.0 \\ 0.0 \\ 1.4 \\ 11.4 \\ 13.0 \end{array}$ | $\begin{array}{r} (0.7-5.6) \\ (0.4-5.3) \\ (4.4-32.7) \\ (5.8-19.6) \\ (0.4-5.0) \\ (1.4-34.7) \\ - \\ (0.3-6.5) \\ (4.2-27.1) \\ (4.6-31.9) \\ \hline \end{array}$ | <0.001 |
| Total | 4,309 | 4.2 | (2.1-8.2) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data. P-value obtained from Pearson's chi-square test. |  |  |  |  |

Table 3.20: Household Ownership of Agricultural Land, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Anyone in household owns agricultural land |  |  | Mean number of land in hectares $(\mathrm{N}=3,103)$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | Mean | SD |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 864 | 61.3 | (57.5-64.9) |  | 0.66 | 0.76 |
| Central | 862 | 68.3 | (64.8-71.6) |  | 0.49 | 0.66 |
| Western | 859 | 79.4 | (76.2-82.3) | $<0.001$ | 0.54 | 0.93 |
| Mid-western | 862 | 81.6 | (78.8-84.1) |  | 0.51 | 0.81 |
| Far-western | 862 | 70.8 | (67.6-73.8) |  | 0.47 | 0.59 |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 719 | 82.3 | (79-85.2) |  | 0.33 | 0.52 |
| Hill | 1,794 | 73.5 | (70.9-75.9) | <0.001 | 0.38 | 0.51 |
| Terai | 1,796 | 66.5 | (63.9-68.9) |  | 0.73 | 0.95 |
| Location |  |  |  |  |  |  |
| Urban | 598 | 47.0 | (42.3-51.7) | <0.001 | 0.63 | 0.75 |
| Rural | 3,711 | 74.6 | (72.8-76.3) | <0.001 | 0.53 | 0.77 |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 1,155 | 74.9 | (71.7-77.8) |  | 0.28 | 0.39 |
| Second | 902 | 78.8 | (75.4-81.8) |  | 0.45 | 0.61 |
| Middle | 813 | 75.9 | (72.3-79.2) | <0.001 | 0.59 | 0.77 |
| Fourth | 789 | 65.8 | (61.6-69.7) |  | 0.76 | 1.03 |
| Highest | 650 | 58.5 | (53.9-62.9) |  | 0.68 | 0.86 |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 551 | 77.6 | (73.2-81.5) |  | 0.55 | 0.71 |
| Hill Chhetri | 1,045 | 76.1 | (72.6-79.3) |  | 0.39 | 0.49 |
| Terai Brahmin/Chhetri | 111 | 68.9 | (57.6-78.3) |  | 0.93 | 0.91 |
| Other Terai Caste | 291 | 76.9 | (71.3-81.7) |  | 0.88 | 1.06 |
| Hill Dalit | 510 | 66.8 | (61.8-71.5) | <0.001 | 0.25 | 0.37 |
| Terai Dalit | 183 | 49.6 | (41.8-57.3) |  | 0.94 | 1.16 |
| Newar | 152 | 43.0 | (34.2-52.2) |  | 0.32 | 0.47 |
| Hill Janajati | 1,027 | 75.6 | (72.1-78.7) |  | 0.39 | 0.53 |
| Terai Janajati | 354 | 66.1 | (59.9-71.8) |  | 0.61 | 0.79 |
| Muslim | 80 | 56.0 | (43.1-68.1) |  | 1.79 | 1.74 |
| Total | 4,309 | 70.8 | (69.1-72.4) |  | 0.54 | 0.76 |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |

Table 3.21: Household Ownership of Livestock, Herds and Other Farm Animals, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Anyone in household owns livestock, herds, or other farm animals |  |  | No. of household owing livestock ( $\mathrm{N}=3,384$ ) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Buffalo ${ }^{\text {a }}$ | Cows or bulls ${ }^{\text {a }}$ | Goats ${ }^{\text {a }}$ | Chickens and ducks ${ }^{\text {a }}$ | Pigs ${ }^{\text {a }}$ |
|  |  | \% | (95\% CI) | p-value | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 79.6 | (76.1-82.6) |  | 33.4 | 65.4 | 71.0 | 58.8 | 22.0 |
| Central | 862 | 59.6 | (55.9-63.2) |  | 40.7 | 47.8 | 67.3 | 47.5 | 6.2 |
| Western | 859 | 76.1 | (72.7-79.1) | <0.001 | 62.4 | 42.2 | 70.9 | 60.4 | 8.3 |
| Mid-western | 862 | 86.5 | (84.2-88.6) |  | 39.1 | 66.2 | 71.3 | 62.4 | 7.5 |
| Far-western | 862 | 88.7 | (86.4-90.7) |  | 48.7 | 76.4 | 67.3 | 37.6 | 8.5 |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 90.3 | (87.7-92.4) |  | 45.4 | 71.6 | 64.8 | 57.0 | 19.2 |
| Hill | 1,794 | 72.1 | (69.2-74.7) | $<0.001$ | 54.8 | 65.2 | 72.7 | 68.9 | 15.7 |
| Terai | 1,796 | 72.8 | (70.3-75.1) |  | 33.2 | 46.5 | 67.6 | 40.1 | 5.4 |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 37.2 | (32.8-41.7) | <0.001 | 32.2 | 43.8 | 50.9 | 42.7 | 6.2 |
| Rural | 3,711 | 79.6 | (77.8-81.3) | <0.001 | 44.7 | 58.0 | 71.0 | 55.2 | 11.6 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 90.6 | (88.1-92.5) |  | 47.8 | 72.9 | 70.2 | 65.9 | 16.5 |
| Second | 902 | 88.6 | (85.8-90.9) |  | 54.7 | 62.6 | 75.4 | 55.2 | 15.4 |
| Middle | 813 | 85.9 | (82.7-88.5) | $<0.001$ | 40.5 | 53.0 | 72.8 | 49.2 | 8.3 |
| Fourth | 789 | 68.0 | (63.9-71.9) |  | 38.6 | 42.5 | 68.1 | 48.2 | 5.9 |
| Highest | 650 | 35.4 | (31.3-39.7) |  | 24.4 | 39.3 | 48.6 | 47.1 | 4.2 |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 66.4 | (61.4-71.1) |  | 59.7 | 64.5 | 71.3 | 21.9 | 0.3 |
| Hill Chhetri | 1045 | 80.8 | (77.0-84.2) |  | 54.9 | 60.3 | 78.2 | 57.6 | 1.6 |
| Terai Brahmin/Chhetri | 111 | 56.4 | (45.3-66.8) |  | 42.9 | 60.9 | 60.3 | 12.1 | 0.0 |
| Other Terai Caste | 291 | 72.3 | (66.4-77.4) |  | 50.4 | 45.3 | 56.9 | 11.8 | 0.6 |
| Hill Dalit | 510 | 81.6 | (76.9-85.5) | <0.001 | 38.4 | 58.0 | 62.5 | 68.0 | 14.7 |
| Terai Dalit | 183 | 73.4 | (66.0-79.8) | <0.001 | 26.7 | 43.5 | 68.4 | 21.2 | 4.7 |
| Newar | 152 | 36.9 | (28.8-45.8) |  | 21.3 | 31.6 | 46.3 | 82.8 | 9.6 |
| Hill Janajati | 1,027 | 78.1 | (74.6-81.2) |  | 40.4 | 61.7 | 72.4 | 85.8 | 29.5 |
| Terai Janajati | 354 | 82.8 | (77.3-87.2) |  | 26.0 | 54.3 | 69.9 | 60.6 | 14.0 |
| Muslim | 80 | 66.5 | (53.3-77.6) |  | 24.2 | 47.7 | 73.4 | 50.0 | 0.0 |
| Total | 4,309 | 73.7 | (71.9-75.3) |  | 43.8 | 57.0 | 69.6 | 54.4 | 11.2 |

[^14]Table 3.22: Household Food Insecurity During the Last 12 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Food secure |  |  | Mildly food insecure ${ }^{\text {a }}$ |  |  | Moderately food insecure ${ }^{\text {b }}$ |  |  | Severely food insecure ${ }^{\text {c }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ |  | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 60.1 | (56.0-64.1) |  | 15.9 | (13.9-18.2) |  | 17.7 | (14.9-20.8) |  | 6.3 | (4.4-8.9) |  |
| Central | 862 | 54.8 | (49.7-59.8) |  | 18.2 | (15.5-21.3) |  | 21.5 | (19.0-24.2) |  | 5.4 | (4.1-7.1) |  |
| Western | 859 | 68.1 | (62.3-73.3) | <0.001 | 12.4 | (10.9-14.1) | <0.001 | 13.7 | (10.8-17.2) | <0.001 | 5.8 | (4.0-8.5) | <0.001 |
| Mid-western | 862 | 52.2 | (47.7-56.6) |  | 18.4 | (15.4-21.8) |  | 18.0 | (15.4-21.0) |  | 11.4 | (8.7-14.9) |  |
| Far-western | 862 | 63.4 | (58.9-67.6) |  | 9.1 | (7.1-11.5) |  | 16.1 | (14.0-18.4) |  | 11.4 | (9.3-14.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 43.4 | (37.7-49.2) |  | 17.9 | (15.7-20.4) |  | 23.8 | (21.1-26.8) |  | 14.9 | (10.8-20.3) |  |
| Hill | 1,794 | 61.4 | (57.7-65.0) | <0.001 | 17.3 | (15.6-19.2) | 0.008 | 16.1 | (14.3-18.1) | 0.001 | 5.2 | (4.2-6.4) | <0.001 |
| Terai | 1,796 | 59.2 | (55.9-62.5) |  | 14.0 | (12.1-16.1) |  | 19.2 | (17.2-21.4) |  | 7.6 | (6.1-9.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 69.8 | (60.0-78.1) | <0.001 | 12.2 | (9.0-16.2) |  | 14.2 | (9.7-20.5) |  | 3.8 | (2.1-6.7) |  |
| Rural | 3,711 | 57.4 | (54.6-60.1) | . 001 | 16.3 | (15.0-17.8) | 0.009 | 18.7 | (17.1-20.4) | 0.008 | 7.5 | (6.5-8.7) | , |
| Sex of Household |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Head |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 1,369 | 57.9 | (54.6-61.1) | 279 | 14.3 | (12.4-16.5) |  | 20.2 | (17.6-23.1) | 0.014 | 7.5 | (6.2-9.2) |  |
| Female | 2,940 | 59.7 | (56.9-62.3) | 279 | 16.4 | (15.0-18.0) | 082 | 17.1 | (15.7-18.7) | 0.014 | 6.8 | (5.7-8.1) | . 364 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 34.6 | (31.4-38.0) |  | 21.4 | (19.3-23.7) |  | 28.0 | (25.5-30.7) |  | 16.0 | (13.9-18.3) |  |
| Second | 902 | 52.3 | (48.0-56.5) |  | 16.1 | (14.3-18.2) |  | 23.2 | (19.8-26.9) |  | 8.4 | (6.3-11.1) |  |
| Middle | 813 | 59.5 | (55.6-63.4) | $<0.001$ | 16.7 | (14.3-19.6) | <0.001 | 18.0 | (15.5-20.9) | <0.001 | 5.7 | (3.9-8.2) | <0.001 |
| Fourth | 789 | 68.9 | (65.2-72.4) |  | 13.4 | (11.0-16.2) |  | 13.7 | (11.1-16.8) |  | 3.9 | (2.8-5.5) |  |
| Highest | 650 | 80.2 | (76.1-83.7) |  | 11.1 | (8.3-14.8) |  | 7.6 | (5.7-10.1) |  | 1.1 | (0.4-2.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 72.5 | (67.8-76.7) |  | 12.9 | (9.9-16.6) |  | 10.0 | (8.0-12.6) |  | 4.6 | (2.9-7.3) |  |
| Hill Chhetri | 1,045 | 62.2 | (58.2-66.0) |  | 16.3 | (14.3-18.5) |  | 16.0 | (13.1-19.5) |  | 5.5 | (4.4-6.9) |  |
| Terai Brahmin/ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chhetri | 111 | 77.0 | (60.1-88.2) |  | 12.2 | (4.8-27.6) |  | 7.2 | (2.9-17.0) |  | 3.5 | (1.4-8.4) |  |
| Other Terai caste | 291 | 47.4 | (41.2-53.8) |  | 13.8 | (9.7-19.4) |  | 32.2 | (26.7-38.3) |  | 6.5 | (4.0-10.5) |  |
| Hill Dalit | 510 | 46.1 | (40.4-51.8) | <0.001 | 19.7 | (16.1-24.0) | 0.018 | 20.9 | (17.2-25.1) | $<0.001$ | 13.3 | (10.2-17.1) | <0.001 |
| Terai Dalit | 183 | 43.9 | (32.4-56.2) |  | 15.5 | (11.3-20.8) |  | 24.9 | (16.4-35.9) |  | 15.7 | (9.6-24.6) |  |
| Newar | 152 | 76.0 | (67.0-83.1) |  | 13.8 | (9.8-19.2) |  | 7.1 | (3.7-13.1) |  | 3.2 | (0.9-10.9) |  |
| Hill Janajati | 1,027 | 56.5 | (52.8-60.2) |  | 18.1 | (15.8-20.6) |  | 19.7 | (17.5-22.1) |  | 5.7 | (4.3-7.4) |  |
| Terai Janajati | 354 | 59.5 | (50.1-68.2) |  | 15.9 | (11.8-21.0) |  | 15.2 | (9.9-22.7) |  | 9.4 | (5.9-14.7) |  |
| Muslim | 80 | 54.7 | (42.3-66.6) |  | 7.4 | (3.6-14.7) |  | 25.9 | (16.4-38.4) |  | 12.0 | (7.1-19.7) |  |
| Total | 4,309 | 59.1 | (56.7-61.4) |  | 15.8 | (14.6-17.0) |  | 18.1 | (16.8-19.5) |  | 7.0 | (6.1-8.1) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Mildly food insecure households: Those who worried about not having enough food sometimes or often, and/or were unable to eat preferred foods, and/or eat a more monotonous diet than desired and/or some foods considered undesirable but did so only rarely. They did not however cut back on quantity or |  |  |  |  |  |  |  |  |  |  |  |  |  |
| often, and/or have rarely or sometimes started to cut back on quantity by reducing the size of meals or number of meals, but never experienced any of the three most severe conditions. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'Severely food insecure households: Those who had to cut back on meal size or number of meals often and/or had experienced any of the three most severe conditions, even if only rarely. |  |  |  |  |  |  |  |  |  |  |  |  |  |

## CHAPTER 4

## Practices on Infant and

 Young Child FeedingThis chapter provides information on infant and young child feeding practices. Appropriate infant and young child feeding (IYCF) practices include early initiation of breastfeeding, exclusive breastfeeding for the first 6 months of life, continued breastfeeding through age 2, introduction of solid and semisolid foods at age 6 months, and gradual increases in the amount of food given and frequency of feeding as the child gets older. It is also important for young children to receive a diverse diet so that they are eating foods from different food groups to improve the quality of complementary feeding and meet their micronutrient and nutritional needs (WHO 2008).

### 4.1 Ever Breastfed and Early Initiation of Breastfeeding among Children 6-23 Months

Early initiation of breastfeeding is important for both the mother and the child. The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. Early initiation of breastfeeding also encourages bonding between the mother and her newborn facilitating the production of regular breast milk. Thus, it is recommended that children be put to the breast immediately or within 1 hour after birth and that pre-lacteal feeding (i.e., feeding newborns anything other than breast milk before breast milk is regularly given) be discouraged. Table 4.1 shows that breastfeeding is nearly universal in the country and almost all children (98 percent) 6-23 months were breastfed at some time. Among respondents that were the biological mother of the child and ever breastfed the child, a total of 67 percent of children 6-23 months were breastfed within one hour of birth. Two in ten children were breastfed after one hour of birth but within one day while 13 percent initiated breastfeeding after one day of birth. The percentage of children who were breastfed within one hour of birth ranged from 56 percent among other Terai caste group to 78 percent among the Hill Janajati caste group. By sex of children, early initiation of breastfeeding was highest among male
children compared to the female children (72 percent versus 61 percent). Further, the practice of initiating breastmilk after one day was high among female children (10 percent) compared to male children (8 percent). No other background characteristics were associated with timing of initiation of breastmilk (Table 4.1).

### 4.2 Current Breastfeeding and Continued Breastfeeding at 1 Year and 2 Year among Children 6-23 Months

Among children 6-23 months who were ever breastfeed, over nine in ten ( 94 percent) were currently breastfeeding at the time of the survey (Table 4.2). Similarly, 94 percent of children 12-15 months were still breastfeeding at age 1 and 83 percent of children 20-23 months were breastfeeding at age 2 (Figure 4.1). Currently breastfeeding was 98 percent or higher among children 6-8, 9-11 and 12-17 months but then was 86 percent among children 18-23 months. Currently breastfeeding was 91 percent among children in the central region and 86 percent for the highest wealth quintile group, and was lower in urban areas (81 percent) compared to rural areas ( 97 percent).

### 4.3 Bottle Feeding among Children 6-23 Months

The respondents were asked if the child drank anything from a bottle with a nipple in the last 24 hours. Among children 6-23 months, about one in ten (11 percent) were bottle fed. The proportion of bottle fed children was higher in urban areas than rural areas ( 21 percent versus 10 percent). Likewise, bottle feeding was 29 percent among children in the highest wealth quintile group compared to 1 to 12 percent among the other groups. Bottle feeding was highest among children whose mother have higher education (18 percent among SLC and above level of education). Bottle feeding was 18 percent among children 6-8 months and 14 percent among children 12-17 months (Table 4.3).

### 4.4 Consumption of Liquids Other than Breastmilk among Children 6-23 Months

Table 4.4 presents consumption of liquid (other than breastmilk) by children 6-23 months in the last 24 hours. Among children 6-23 months, almost all consumed plain water ( 98 percent). One-third ( 34 percent) of children had consumed tea and 51 percent did so in the Western region. Consumption of other liquids was lower among children, less than 10 percent had consumed sugar or glucose water (seven percent), gripe water (two percent), salt-sugar water (three percent), infant formula (five percent), honey (four percent), starch/rice-water (six percent), yogurt (10 percent), and other liquid (eight percent). Over one in ten (14 percent) children had consumed fruit juice (Table 4.4). Consumption of liquids such as sugar or glucose water, gripe water, salt-sugar water, fruit juice and infant formula were higher among children from the highest wealth quintile.

### 4.5 Timely Introduction of Complementary Food among Children 6-8 Months

Figure 4.1 shows that 79 percent of children age 6-8 months had received solid or semi-solid foods in the previous day or night of the survey.

### 4.6 Minimum Dietary Diversity, Minimum Meal Frequency and Minimum Acceptable Diet among Children 6-23 Months

WHO defined recommended indicators to assess the minimum dietary diversity, the minimum meal frequency and the minimum acceptable diet for children aged 6-23 months (WHO, 2008). The minimum dietary diversity is defined as intake from at least four of the seven main food groups in the previous day. The seven food groups include grains, roots and tubers, legumes and nuts, dairy products (milk, yogurt, and cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin A rich fruits and vegetables, and other fruits and vegetables.

Minimum meal frequency is defined as the child consuming the minimum number of solid, semi-solid or soft food snacks/meals the previous day. The indicator defines 'minimum' differently for breastfed and non-breastfed children, as well as by age. 'Minimum frequency' is defined as two or more times per day for a breastfed child aged 6-8 months, three or more times for a breastfed child aged 9-23 months and four or more times for non-breastfed children aged 6-23 months. Meals include both meals and snacks, and feeding frequency for nonbreastfed children includes both milk feeds and solid/semi-solid foods.

Minimum acceptable diet is the composite of the minimum meal frequency and minimum dietary diversity consumed by the child currently breastfeeding in the previous day. For nonbreastfeeding children, it is the composite of children who had at least 2 milk feeds and had the minimum dietary diversity not including milk feeds, and the minimum meal frequency the previous day.

Table 4.5 presents the percentage of children age 6-23 months who are fed according to minimum recommended standards. Overall, 46 percent of children had received the minimum dietary diversity, 77 percent had received the minimum meal frequency for their age and lactation status, and 38 percent had met the criteria of minimum acceptable diet the previous day. The percent meeting the criteria for minimum dietary diversity and minimum acceptable diet increased with increasing age of the children (Minimum dietary diversity: 14 percent among 6-8 months, 28 percent among 9-11 months, 48 percent among 12-17 months and 65 percent among 18-23 months; Minimum acceptable diet: 14 percent among 6-8 months, 25 percent among 9-11 months, 40 percent among 12-17 months and 52 percent among 18-23 months). In the Terai, 39 percent consumed the minimum dietary diversity, 71 percent the minimum meal frequency and 30 percent the minimum acceptable diet. Minimum dietary diversity varied significantly by wealth quintile while this association was not found for minimum meal frequency and minimum acceptable diet; 37 percent of children in the lowest wealth quintile met the minimum dietary diversity criteria and 57 percent in the highest did so.

Figure 4.1: Infant and Young Child Feeding Indicators, Nepal National Micronutrient Status Survey, 2016

${ }^{1}$ Early initiation of breast feeding: Breastfed immediately or within 1 hour after birth.
${ }^{2}$ Minimum dietary diversity: Intake from at least four of the seven main food groups in the previous day. The seven food groups include grains, roots and tubers, legumes and nuts, dairy products (milk, yogurt, and cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin A rich fruits and vegetables, and other fruits and vegetables.
${ }^{3}$ Minimum meal frequency: The child consuming the minimum number of solid, semi-solid or soft food snacks/meals the previous day. The indicator defines 'minimum' differently for breastfed and non-breastfed children, as well as by age. 'Minimum frequency' is defined as two or more times per day for a breastfed child aged 6-8 months, three or more times for a breastfed child aged $9-23$ months and four or more times for non-breastfed children aged 6-23 months. Meals include both meals and snacks, and feeding frequency for non-breastfed children includes both milk feeds and solid/semi-solid foods.
${ }^{4}$ Minimum acceptable diet: The composite of the minimum meal frequency and minimum dietary diversity consumed by the child currently breastfeeding in the previous day. For non-breastfeeding children, it is the composite of children who had at least 2 milk feeds and had the minimum dietary not including milk feeds, and the minimum meal frequency the previous day.

### 4.7 Types of Foods Consumed by Children 6-59 Months in the Preceding Day of the Survey

After the first 6 months, breast milk is no longer enough to meet the nutritional needs of the infant; therefore, complementary foods should be added to the diet of the child. The transition from exclusive breastfeeding to family foods is referred as complementary feeding. This is the most critical period for infants and young children, because they are most vulnerable to becoming undernourished during this transition. Complementary feeding should be timely, i.e., all infants should start receiving foods in addition to breast milk starting from 6 months of age. Appropriate complementary feeding should include feeding children a variety of foods to ensure that requirements for nutrients are met. Fruits and vegetables rich in vitamin A should be consumed daily. Eating a range of fruits and vegetables, in addition to those rich in vitamin A, is also important. Studies have shown that plant-based complementary foods by themselves are insufficient to meet the needs for certain micronutrients. Therefore, it is recommended that meat, poultry, fish, or eggs should be part of the daily diet as well or eaten as often as possible (WHO 1998).

Table 4.6 shows the percentage of children 6-59 months by the types of foods consumed in the day and/or night preceding the interview by child's background characteristics. The commonly
consumed foods were made from grains/roots/tubers (98 percent), followed by food made from legumes and nuts ( 74 percent), other fruits and vegetables ( 55 percent), dairy products (49 percent) and vitamin A rich fruits and vegetables ( 42 percent). The results show that plant based complementary foods are commonly consumed by children 6-59 months, whereas the consumption of meat/fish and eggs were 27 percent and 12 percent, respectively, among the children in this age category. Seven percent of children 6-59 months had consumed micronutrient fortified complementary foods (Table 4.6).

Table 4.7 shows the percentage of children 6-59 months who consumed specific foods and beverages such as sweet foods (candy, chocolate, cakes/pastries, sweet biscuits/cookies and ice cream), sugar sweetened beverages (purchased or homemade soft drinks or juice with added sugar), tea, coffee and industrially produced complementary food (cerelac, sarbottam pitho/lito, other vitamin and mineral mixed food) in the day and night preceding the survey. Three quarters of children ( 75 percent) consumed sweet foods and 22 percent consumed sugar sweetened beverages. Consumption of tea among children was 45 percent the previous day, while less than or one percent consumed coffee or Tibetan tea, respectively. Tibetan tea is normally found in Mountain and higher Hill areas and that two percent of children in these regions had Tibetan tea. In total, seven percent of children consumed industrially produced complementary foods rich in vitamins and minerals.

Table 4.8 shows the percentage of children 6-59 months who consumed cooking fats including vegetable ghee, cooking oil or animal fat (butter or animal ghee) in the previous day and night of the survey. Usually vegetables are cooked with oil in the country and over nine in ten children ( 95 percent) consumed foods made with cooking oil the day prior to the survey; 20 percent consumed foods made with animal fat and two percent consumed foods made with vegetable ghee.

### 4.8 Consumption of Food Made from Purchased Wheat Flour and Vegetable Ghee

Table 4.9 shows the intake of food made from purchased wheat flour in the previous day and within 7 days before the survey. Overall, 16 percent of children had consumed the food at home prepared from purchased maida or atta wheat flour in the previous day. Among those who have consumed, in the past 7 days the children consumed the flour a median of 3 days. Almost half ( 48 percent) consumed the flour on 1-2 days in the past 7 days, a quarter (26 percent) consumed it on 3-4 days, over one in ten ( 11 percent) consumed it on 5-6 days, while 15 percent consumed it every day over the last 7 days. Consumption of purchased wheat flour in the previous day was 27 percent in the Western region, 21 percent in the Terai and 23 percent in urban areas among children 6-59 months. These results do not reflect any consumption of pre-prepared foods made with wheat flour consumed at home, or foods made with wheat flour consumed outside the home.

Overall, one percent of children consumed food made from purchased vegetable ghee in the previous day before the survey (data not shown).

### 4.9 PICA Syndrome among Children 6-59 Months

Caregivers were asked about child consumption of clay, earth or termite mounds among children 6-59 months in the last 7 days. Out of 1,709 children, 69 consumed these non-food items and they consumed them an average of three times over the prior 7 days (data not shown).

Table 4.10 shows the consumption of uncooked rice, starch or ice among children 6-59 months in the last 7 days. Out of 1,709 children, eight percent had consumed uncooked rice, starch or ice during the last 7 days. Out of those who had consumed, 59 percent consumed 1-3 times while 42 percent had consumed more than 4 times in the past 7 days (data not shown). The median days of consumption by children 6-59 months was 2 days (data not shown).

Any PICA syndrome among children 6-59 months was 14 percent ranging from nine percent in Eastern region to 30 percent in Far-western region. In the Mountain region, any PICA among children was 21 percent, and in the Hill and Terai regions, it was 11 percent and 15 percent respectively. The level of education of the mother was associated with PICA among children where it was 19-23 percent among children with mothers having no education or a primary level of education to 11 percent among those having some secondary level of education and eight percent among those with SLC or higher level of education. By caste, Terai Janajati and Muslim children showed PICA syndrome prevalence of 25 and 26 percent, respectively (Table 4.10).

## List of Tables

For more information on infant and young child feeding practices, see the following tables:

Table 4.1: Ever Breastfed and Early Initiation of Breastfeeding among Children 6-23 Months
Table 4.2: $\quad$ Currently Breastfeeding among Children 6-23 Months
Table 4.3: Selected Child Drank from a Bottle with a Nipple in the Last 24 Hours among Children 6-23 Months
Table 4.4: Consumption of Liquids Other than Breastmilk in the Last 24 Hours among Children 623 Months
Table 4.5: $\quad$ Minimum Dietary Diversity, Minimum Meal Frequency and Minimum Acceptable Diet among Children 6-23 Months
Table 4.6: Consumption of Grains, Meat, Fruits, and Vegetables among Children 6-59 Months
Table 4.7: Consumption of Specific Foods and Beverages among Children 6-59 Months
Table 4.8: Consumption of Fats among Children 6-59 Months
Table 4.9: Consumption of Foods Made at Home with Purchased Maida or Atta Wheat Flour Yesterday and During the Last 7 Days among Children 6-59 Months
Table 4.10: Consumption of Uncooked Rice, Starch or Ice and Any PICA during the Last 7 Days among Children 6-59 Months

Table 4.1: Ever Breastfed and Early Initiation of Breastfeeding among Children 6-23 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Ever breastfed |  |  |  | Early initiation of breastfeeding, among those ever breastfed and biological mother is respondent |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | N | $\begin{array}{\|c\|} \hline \begin{array}{c} \text { Immediately or within one } \\ \text { hour of birth } \end{array} \\ \hline \end{array}$ |  |  | $\begin{array}{\|c\|} \hline \begin{array}{c} \text { After one hour but within } \\ \text { a day } \end{array} \\ \hline \end{array}$ |  |  | After one day |  |  |
|  | N | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 107 | 98.3 | (89.2-99.8) |  | 105 | 70.5 | (60.6-78.8) |  |  | (13.9-31.5) |  | 8.1 | (3.7-16.9) |  |
| Central | 112 | 97.2 | (91.5-99.1) |  | 109 | 62.1 | (49.9-73.0) |  |  | (23.1-37.4) |  | 8.1 | (3.4-18.0) |  |
| Western | 79 | 98.9 | (92.6-99.8) | 0.737 | 77 | 61.5 | (47.1-74.2) | 0.090 |  | (18.4-43.9) | 0.077 | 8.9 | (3.5-20.7) | 0.741 |
| Mid-western | 105 | 97.4 | (92.2-99.2) |  | 101 | 70.4 | (61.2-78.1) |  |  | (12.0-24.6) |  | 12.1 | (7.5-19.0) |  |
| Far-western | 106 | 99.0 | (93.4-99.9) |  | 104 | 81.0 | (71.5-87.9) |  | 14.4 | (8.8-22.7) |  | 4.6 | (1.7-11.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 70 | 94.7 | (84.8-98.3) |  | 67 | 77.4 | (63.8-86.9) |  |  | (10.6-32.9) |  | 3.2 | (0.8-12.1) |  |
| Hill | 218 | 98.3 | (93.4-99.6) | 0.306 | 213 | 65.1 | (57.4-72.0) | 0.306 | 26.6 | (20.6-33.6) | 0.517 | 8.3 | (5.3-12.8) | 0.485 |
| Terai | 221 | 98.1 | (94.3-99.3) |  | 216 | 66.9 | (57.5-75.1) |  | 23.9 | (18.6-30.2) |  | 9.2 | (4.9-16.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 78 | 98.0 | (87.3-99.7) |  | 75 | 70.1 | (53.4-82.8) |  |  | (12.2-41.3) |  | 6.1 | (2.6-13.4) |  |
| Rural | 431 | 97.9 | (95.5-99.1) | 0.710 | 421 | 66.3 | (59.5-72.4) | 0.591 |  | (20.3-30.1) | 0.754 | 8.8 | (5.7-13.4) | 0.387 |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 100.0 |  |  | 72 | 51.9 | (38.7-64.9) |  |  | (29.8-54.7) |  | 6.3 | (1.7-20.9) |  |
| 9-11 | 88 | 99.2 | (94.7-99.9) | 0.419 | 87 | 69.5 | (58.1-79.0) | 0.031 |  | (11.1-26.6) | 0.002 | 12.9 | (6.6-23.8) | 0.417 |
| 12-17 | 182 | 97.0 | (91.5-99.0) |  | 178 | 71.2 | (62.7-78.5) |  |  | (15.0-28.8) |  | 7.7 | (4.7-12.4) |  |
| 18-23 | 166 | 97.5 | (92.8-99.2) |  | 159 | 66.8 | (57.1-74.5) |  | 25.1 | (18.6-33.0) |  | 8.0 | (3.6-16.9) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 257 | 97.6 | (93.5-99.1) | . 490 | 251 | 71.8 | (65.2-77.5) |  |  | (16.1-26.4) |  | 7.5 | (4.4-12.4) |  |
| Female | 252 | 98.3 | (95.4-99.4) |  | 245 | 61.1 | (52.7-69.0) |  | 29.3 | (24.0-35.2) |  | 9.6 | (5.4-16.4) |  |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 51 | 100.0 | (0.0-0.0) |  | 51 | 70.3 | (55.8-81.6) |  |  | (15.6-34.6) |  | 5.8 | (1.5-20.2) |  |
| Primary ${ }^{\text {b }}$ | 47 | (99.2) | (94.7-99.9) |  | 45 | (71.2) | (54.7-83.5) |  | (20.8) | (10.5-37.0) |  | (8.0) | (2.4-24.1) |  |
| Some secondary ${ }^{\text {c }}$ | 80 | 97.0 | (91.5-99.0) |  | 78 | 56.6 | (43.1-69.2) | 0.326 |  | (22.5-50.0) | 0.317 | 8.4 | (3.1-20.6) | 0.796 |
| SLC and above ${ }^{\text {d }}$ | 77 | 97.5 | (92.8-99.2) |  | 75 | 63.6 | (53.5-72.7) |  | 31.8 | (22.3-41.7) |  | 4.6 | (2.4-8.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 131 | 97.1 | (90.1-99.2) |  | 127 | 66.8 | (59.5-73.6) |  | 27.9 | (22.0-34.7) |  | 5.5 | (2.8-9.8) |  |
| Second | 108 | 99.3 | (95.4-99.9) |  | 106 | 61.5 | (46.7-74.5) |  | 26.2 | (18.5-35.7) |  | 12.2 | (5.1-26.6) |  |
| Middle | 101 | 99.6 | (97.2-99.9) | 0.044 | 100 | 67.9 | (58.8-75.9) | 0.742 |  | (14.0-31.7) | 0.841 | 10.5 | (5.3-19.9) | 0.329 |
| Fourth | 86 | 99.1 | (93.6-99.9) |  | 85 | 66.5 | (55.1-76.3) |  | 25.4 | (17.2-35.8) |  | 8.0 | (4.1-15.1) |  |
| Highest | 83 | 94.8 | (84.9-98.4) |  | 78 | 70.6 | (56.9-81.4) |  | 23.0 | (13.4-36.7) |  | 6.3 | (2.7-14.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 52 | 94.9 | (78.7-99.0) |  | 49 | (74.9) | (62.3-84.4) |  | (15.6) | (8.9-25.7) |  | (9.5) | (3.8-22.2) |  |
| Hill Chhetri | 120 | 98.4 | (89.8-99.8) |  | 118 | 62.3 | (52.8-70.8) |  | 27.0 | (18.3-38.0) |  | 10.7 | (6.7-16.8) |  |
| Terai |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 14 |  |  |  | 14 | * | * |  | * | * |  | * | * |  |
| Other Terai Caste | 43 | (100.0) |  |  | 43 | (55.6) | (32.5-76.5) |  | (30.4) | (20.6-42.3) |  | (14.0) | (4.2-37.4) |  |
| Hill Dalit | 81 | 98.9 | (92.5-99.8) | 0.030 | 79 | 61.3 | (49.4-71.9) | 0.020 |  | (20.6-39.9) | 0.121 | 9.4 | (4.7-17.7) | 0.218 |
| Terai Dalit | 31 | (91.5) | (71.6-97.9) |  | 29 | (61.1) | (45.0-75.1) |  | (35.5) | (22.2-51.5) |  | (3.4) | (0.4-22.4) |  |
| Newar | 18 |  |  |  | 18 |  |  |  |  |  |  | * | * |  |
| Hill Janajati | 100 |  | (95.9-99.9) |  | 98 |  | (68.4-85.1) |  |  | (11.9-27.8) |  | 3.6 | (1.3-9.7) |  |
| Terai Janajati | 36 | (98.7) | (91.4-99.8) |  | 35 | (74.4) | (56.5-86.7) |  | (17.8) | (7.7-36.1) |  |  | (1.6-31.0) |  |
| Muslim | 14 |  | * |  | 13 | * |  |  | * | * |  | * | * |  |
| Total | 509 | 97.9 | (95.7-99.0) |  | 496 | 66.8 | (61.5-71.7) |  | 19.8 | (15.8-24.6) |  | 13.4 | (10.2-17.5) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {C Includes those who have completed 6-9 years of school. }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 4.2: Currently Breastfeeding among Children 6-23 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Currently breastfeeding ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 106 | 93.3 | (83.4-97.5) |  |
| Central | 109 | 91.3 | (83.5-95.6) |  |
| Western | 78 | 100.0 | - | 0.046 |
| Mid-western | 102 | 95.6 | (87.6-98.5) |  |
| Far-western | 105 | 96.8 | (91.8-98.8) |  |
| Ecological Region |  |  |  |  |
| Mountain | 67 | 99.0 | (92.9-99.9) |  |
| Hill | 216 | 94.8 | (89.5-97.5) | 0.287 |
| Terai | 217 | 93.3 | (87.5-96.6) |  |
| Location |  |  |  |  |
| Urban | 77 | 80.9 | (65.0-90.7) | <0.001 |
| Rural | 423 | 96.5 | (93.5-98.1) |  |
| Age, months |  |  |  |  |
| 6-8 | 73 | 97.8 | (85.9-99.7) |  |
| 9-11 | 87 | 100.0 | - | <0.001 |
| 12-17 | 178 | 97.6 | (91.8-99.3) |  |
| 18-23 | 162 | 86.4 | (77.8-92.0) |  |
| Sex |  |  |  |  |
| Male | 253 | 93.5 | (87.8-96.7) | 332 |
| Female | 247 | 95.2 | (90.7-97.6) | 2 |
| Maternal Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 51 | 99.4 | (96.0-99.9) |  |
| Primary ${ }^{\text {c }}$ | 45 | (92.8) | (75.9-98.1) |  |
| Some secondary ${ }^{\text {d }}$ | 78 | 97.9 | (86.3-99.7) |  |
| SLC and above ${ }^{\text {e }}$ | 77 | 95.9 | (86.1-98.9) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 128 | 98.0 | (92.1-99.5) |  |
| Second | 107 | 97.2 | (91.6-99.1) |  |
| Middle | 100 | 94.8 | (86.1-98.2) | 0.001 |
| Fourth | 85 | 96.0 | (85.4-99.0) |  |
| Highest | 80 | 85.9 | (73.1-93.2) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 50 | 95.9 | (75.9-99.4) |  |
| Hill Chhetri | 119 | 93.2 | (82.9-97.5) |  |
| Terai Brahmin/Chhetri | 14 | * | * |  |
| Other Terai Caste | 43 | (95.3) | (82.8-98.8) |  |
| Hill Dalit | 80 | 90.4 | (74.3-96.8) |  |
| Terai Dalit | 29 | (90.8) | (69.4-97.7) |  |
| Newar | 18 | * | * |  |
| Hill Janajati | 99 | 98.1 | (92.1-99.6) |  |
| Terai Janajati | 35 | (100.0) | - |  |
| Muslim | 13 | * | * |  |
| Total | 500 | 94.3 | (90.9-96.5) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data
P -value obtained from Pearson's chi-square test.
${ }^{\mathrm{a}}$ Among children ever breastfed.
${ }^{\mathrm{b}}$ Includes those who have never attended school.
${ }^{\text {c I Includes the }}$ those have completed 0-5 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
${ }^{\mathrm{e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

Table 4.3: Selected Child Drank from a Bottle with a Nipplein the Last 24 Hours among Children 6-23 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Bottle Feeding |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{array}{r} 104 \\ 111 \\ 78 \\ 105 \\ 105 \end{array}$ | $\begin{array}{r} 15.6 \\ 11.8 \\ 9.3 \\ 6.6 \\ 9.3 \end{array}$ | $\begin{aligned} & (8.9-26.0) \\ & (6.8-19.8) \\ & (4.2-19.6) \\ & (3.1-13.5) \\ & (5.0-16.9) \end{aligned}$ | 0.411 |
| Ecological Region Mountain Hill Terai | $\begin{array}{r} 70 \\ 218 \\ 215 \end{array}$ | $\begin{aligned} & 11.8 \\ & 11.8 \\ & 10.8 \end{aligned}$ | $\begin{aligned} & (5.7-23.0) \\ & (7.2-18.8) \\ & (7.0-16.4) \end{aligned}$ | 0.940 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 78 \\ 425 \\ \hline \end{array}$ | $\begin{array}{r} 20.7 \\ 9.8 \\ \hline \end{array}$ | $\begin{array}{r} (11.9-33.5) \\ (6.7-13.9) \end{array}$ | 0.007 |
| $\begin{array}{\|c} \hline \text { Age, months } \\ 6-8 \\ 9-11 \\ 12-17 \\ 18-23 \end{array}$ | $\begin{array}{r} 73 \\ 88 \\ 178 \\ 164 \end{array}$ | $\begin{array}{r} 17.8 \\ 6.5 \\ 13.8 \\ 8.2 \end{array}$ | $\begin{aligned} & (9.1-31.9) \\ & (2.8-14.3) \\ & (8.5-21.5) \\ & (4.4-14.7) \end{aligned}$ | 0.041 |
| Sex <br> Male <br> Female | $\begin{aligned} & 253 \\ & 250 \end{aligned}$ | $\begin{array}{r} 13.5 \\ 8.9 \end{array}$ | $\begin{aligned} & (9.0-19.7) \\ & (5.5-14.0) \end{aligned}$ | 0.087 |
| Maternal Education <br> No education ${ }^{\text {a }}$ <br> Primary ${ }^{\text {b }}$ <br> Some secondary ${ }^{\text {c }}$ <br> SLC and above ${ }^{\text {d }}$ | $\begin{aligned} & 51 \\ & 47 \\ & 79 \\ & 77 \\ & \hline \end{aligned}$ | $\begin{array}{r} 1.3 \\ (11.9) \\ 6.5 \\ 17.5 \end{array}$ | $\begin{array}{r} (0.2-8.7) \\ (4.1-29.8) \\ (2.3-17.2) \\ (9.0-31.2) \\ \hline \end{array}$ | 0.012 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{array}{r} 131 \\ 107 \\ 100 \\ 83 \\ 82 \end{array}$ | $\begin{array}{r} 1.3 \\ 2.1 \\ 11.9 \\ 10.7 \\ 28.8 \\ \hline \end{array}$ | $\begin{array}{r} (0.3-5.2) \\ (0.7-5.9) \\ (6.3-21.1) \\ (5.5-19.7) \\ (18.7-41.8) \\ \hline \end{array}$ | $<0.001$ |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 52 \\ 120 \\ 14 \\ 41 \\ 81 \\ 30 \\ 18 \\ 100 \\ 33 \\ 14 \end{array}$ | $\begin{array}{r} 16.3 \\ 14.8 \\ * \\ (3.9) \\ 13.6 \\ (8.5) \\ * \\ 7.1 \\ (12.1) \\ * \end{array}$ | $\begin{array}{r} (7.8-31.2) \\ (7.7-26.6) \\ * \\ (1.0-14.7) \\ (5.6-29.5) \\ (2.1-28.4) \\ * \\ (3.0-15.9) \\ (3.5-34.4) \end{array}$ | 0.148 |
| Total | 503 | 11.3 | (8.3-15.2) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c I Includes those who have completed 6-9 years of school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 4.4: Cont'd...


| Characteristics | N | Minimum Dietary Diversity ${ }^{\text {a }}$ |  |  | Minimum Meal Frequency ${ }^{\text {b }}$ |  |  | Minimum Acceptable Diet ${ }^{\text {c }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 107 | 38.1 | (29.9-47.0) |  | 77.6 | (67.6-85.2) |  | 34.1 | (26.6-42.6) |  |
| Central | 112 | 54.0 | (41.8-65.9) |  | 74.8 | (64.6-82.9) |  | 41.3 | (32.1-51.1) |  |
| Western | 79 | 48.3 | (36.8-60.0) | 0.019 | 79.6 | (71.1-86.0) | 0.785 | 42.0 | (31.2-53.6) | 0.493 |
| Mid-western | 105 | 35.1 | (25.7-45.9) |  | 81.7 | (72.3-88.4) |  | 32.3 | (23.6-42.3) |  |
| Far-western | 106 | 43.9 | (35.9-52.3) |  | 76.3 | (68.3-82.8) |  | 35.5 | (28.2-43.6) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 70 | 43.7 | (31.4-56.7) |  | 87.7 | (78.4-93.4) |  | 37.2 | (25.2-51.0) |  |
| Hill | 218 | 54.5 | (47.8-61.1) | 0.003 | 83.7 | (79.2-87.4) | 0.001 | 48.4 | (41.6-55.3) | <0.001 |
| Terai | 221 | 39.0 | (30.5-48.3) |  | 70.8 | (62.7-77.7) |  | 29.5 | (23.6-36.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 78 | 49.9 | (37.8-61.9) |  | 84.3 | (72.0-91.8) |  | 39.1 | (30.2-48.8) |  |
| Rural | 431 | 45.2 | (39.4-51.2) | 0.442 | 76.2 | (70.9-80.8) | 0.145 | 37.8 | (32.7-43.2) | 0.821 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 14.4 | (7.7-25.3) |  | 70.2 | (58.1-80.1) |  | 13.8 | (7.2-24.8) |  |
| 9-11 | 88 | 27.6 | (19.5-37.5) |  | 73.0 | (62.1-81.7) |  | 25.2 | (17.3-35.1) |  |
| 12-17 | 182 | 48.1 | (41.4-54.9) |  | 75.7 | (64.6-84.2) | 0.055 | 39.6 | (31.9-47.8) | <0.001 |
| 18-23 | 166 | 65.2 | (56.6-72.8) |  | 84.2 | (75.9-90.0) |  | 52.4 | (44.1-60.5) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 257 | 45.8 | (38.9-52.8) |  | 78.1 | (70.6-84.1) |  | 37.7 | (31.1-44.8) |  |
| Female | 252 | 45.9 | (38.4-53.6) | 0.926 | 76.5 | (70.6-81.5) | 0.680 | 38.3 | (32.4-44.6) | 0.906 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 51 | 43.0 | (31.6-55.2) |  | 75.2 | (63.6-84.0) |  | 36.8 | (26.4-48.6) |  |
| Primary ${ }^{\text {e }}$ | 47 | (47.2) | (32.5-62.4) | 0.075 | (83.3) | (67.2-92.4) | 0.304 | (43.9) | (29.2-59.8) |  |
| Some secondary ${ }^{\text {f }}$ | 80 | 35.3 | (23.5-49.1) | 0.075 | 70.6 | (55.9-82.0) | 0.304 | 23.2 | (16.3-32.0) | 0.013 |
| SLC and above ${ }^{\text {b }}$ | 77 | 55.1 | (42.2-67.2) |  | 81.0 | (68.5-89.3) |  | 47.5 | (34.7-60.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 131 | 36.7 | (27.7-46.8) |  | 77.5 | (71.1-82.8) |  | 31.4 | (22.9-41.2) |  |
| Second | 108 | 46.9 | (38.6-55.4) |  | 75.7 | (67.7-82.2) |  | 39.8 | (31.3-48.9) |  |
| Middle | 101 | 38.4 | (29.3-48.5) | 0.016 | 69.0 | (53.4-81.2) | 0.121 | 31.7 | (23.2-41.6) | 0.079 |
| Fourth | 86 | 49.9 | (37.5-62.4) |  | 83.5 | (73.4-90.3) |  | 40.0 | (28.5-52.8) |  |
| Highest | 83 | 57.3 | (41.3-71.8) |  | 81.5 | (69.7-89.3) |  | 47.1 | (32.7-62.0) |  |

Table 4.5: Cont’d ..


| Characteristics | N | Food made from grains, roots and tubers |  |  | Legumes and nuts |  |  | Dairy products |  |  | Meat/Fish |  |  | Eggs |  |  | Vitamin A rich fruits and vegetables |  |  | Other fruits and vegetables |  |  | Fortified complementaryfood |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Central | 355 | 98.1 | (96.0-99.1) |  | 76.4 | (70.4-81.5) |  | 50.0 | (45.6-54.4) |  | 26.6 | (20.7-33.6) |  | 13.6 | (10.7-17.2) |  | 44.2 | (38.3-50.3) |  | 55.0 | (48.1-61.8) |  | 8.0 | (5.7-11.1) |  |
| Western | 294 | 98.9 | (97.6-99.5) | 0.764 | 76.4 | (70.9-81.1) | 0.010 | 50.7 | (40.8-60.6) | $<0.001$ | 32.5 | (25.3-40.7) | 0.049 | 12.3 | (7.8-18.8) | 0.049 | 37.7 | (33.5-42.1) | 0.432 | 58.2 | (52.5-63.8) | 0.152 | 5.7 | (4.2-7.8) | 0.368 |
| Mid-western | 351 | 98.5 | (96.1-99.4) |  | 65.8 | (59.7-71.5) |  | 36.0 | (27.9-44.9) |  | 23.6 | (16.6-32.4) |  | 11.8 | (8.0-17.1) |  | 42.2 | (36.1-48.5) |  | 59.1 | (53.3-64.6) |  | 4.4 | (2.8-6.9) |  |
| Far-western | 377 | 98.8 | (96.8-99.6) |  | 75.7 | (69.6-80.9) |  | 56.6 | (47.5-65.2) |  | 21.0 | (16.0-27.1) |  | 5.0 | (3.1-7.9) |  | 41.7 | (34.0-49.7) |  | 57.0 | (50.2-63.6) |  | 5.9 | (3.5-9.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 100.0 | (0.0-100.0) |  | 69.8 | (62.3-76.4) |  | 42.6 | (31.4-54.7) |  | 28.5 | (19.3-39.9) |  | 12.6 | (9.4-16.7) |  | 43.2 | (35.4-51.4) |  | 51.5 | (40.0-62.9) |  | 5.8 | (3.5-9.4) |  |
| Hill | 707 | 99.2 | (98.6-99.5) | 0.010 | 72.4 | (68.6-75.8) | 0.265 | 46.8 | (43.0-50.7) | 0.073 | 30.7 | (26.4-35.3) | 0.004 | 11.5 | (9.1-14.5) | 0.977 | 51.7 | (47.9-55.6) | $<0.001$ | 56.5 | (53.6-59.4) | 0.543 | 8.1 | (6.2-10.3) | 0.129 |
| Terai | 727 | 97.4 | (95.8-98.5) |  | 75.0 | (70.0-79.5) |  | 51.3 | (45.3-57.3) |  | 23.3 | (18.6-28.8) |  | 11.6 | (8.6-15.6) |  | 34.6 | (30.2-39.4) |  | 54.9 | (48.9-60.7) |  | 5.6 | (3.7-8.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 98.7 | (95.9-99.6) |  | 76.7 | (67.6-83.8) |  | 67.6 | (57.2-76.5) |  | 27.1 | (19.2-36.8) |  | 11.6 | (6.8-19.1) |  | 40.0 | (31.5-49.1) |  | 60.5 | (51.7-68.7) |  | 10.5 | (6.0-17.7) |  |
| Rural | 1,482 | 98.3 | (97.3-98.9) | 0.712 | 73.1 | (69.9-76.0) | 0.256 | 45.9 | (42.3-49.6) | <0.001 | 26.7 | (23.1-30.6) | 0.871 | 11.7 | (9.7-14.1) | 0.983 | 42.7 | (39.6-45.9) | 0.426 | 54.5 | (51.1-57.9) | 0.091 | 6.0 | (4.9-7.5) | 0.017 |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 70.4 | (55.7-81.8) |  | 48.4 | (36.1-60.9) |  | 32.5 | (22.1-44.9) |  | 7.3 | (5.2-10.3) |  | 1.8 | (0.2-12.9) |  | 18.5 | (10.1-31.4) |  | 29.2 | (18.9-42.2) |  | 29.1 | (19.7-40.7) |  |
| 9-11 | 88 | 96.0 | (93.3-97.6) |  | 67.5 | (53.9-78.7) |  | 49.1 | (39.0-59.3) |  | 11.0 | (5.4-21.0) |  | 11.3 | (5.8-20.7) |  | 20.1 | (12.9-29.9) |  | 30.7 | (22.1-41.0) |  | 18.9 | (12.4-27.7) |  |
| 12-17 | 182 | 98.2 | (94.5-99.4) |  | 72.7 | (64.9-79.3) |  | 48.5 | (40.0-57.0) |  | 28.0 | (21.4-35.8) |  | 12.4 | (8.6-17.6) |  | 33.6 | (27.9-39.7) |  | 53.1 | (45.3-60.8) |  | 7.6 | (3.8-14.8) |  |
| 18-23 | 166 | 100.0 | (0.0-100.0) | <0.001 | 81.8 | (75.5-86.8) | <0.001 | 61.2 | (51.2-70.3) | <0.001 | 21.0 | (15.3-28.0) | <0.001 | 17.1 | (11.7-24.4) | 0.038 | 47.4 | (39.3-55.7) | <0.001 | 60.0 | (51.6-67.8) | $<0.001$ | 10.6 | (6.5-16.7) | <0.001 |
| 24-35 | 392 | 100.0 | (0.0-100.0) |  | 71.2 | (66.1-75.9) |  | 51.7 | (46.4-57.0) |  | 27.6 | (22.1-34.0) |  | 10.6 | (7.6-14.6) |  | 43.1 | (37.4-49.0) |  | 57.9 | (52.9-62.8) |  | 4.5 | (2.5-7.9) |  |
| 36-47 | 417 | 100.0 | (0.0-100.0) |  | 78.1 | (72.5-82.9) |  | 50.2 | (44.4-56.0) |  | 28.6 | (24.6-33.0) |  | 11.9 | (9.3-15.2) |  | 46.5 | (41.2-51.8) |  | 56.5 | (50.3-62.5) |  | 3.5 | (2.1-5.9) |  |
| 48-59 | 391 | 100.0 | (0.0-100.0) |  | 73.5 | (67.6-78.6) |  | 42.1 | (35.5-49.0) |  | 32.6 | (27.3-38.5) |  | 11.6 | (8.1-16.5) |  | 48.5 | (42.7-54.4) |  | 60.5 | (55.1-65.6) |  | 3.0 | (1.6-5.5) |  |
| 6-23 | 509 | 94.6 | (91.8-96.5) |  | 71.5 | (66.3-76.2) |  | 50.6 |  |  |  |  |  | 12.3 |  |  | 33.9 |  |  |  |  |  |  |  |  |
| 24-59 | 1,200 | 100.0 | (0.0-100.0) | <0.001 | 74.4 | (70.5-78.0) | 0.224 | 48.0 | (44.4-51.7) | 0.341 | $29.6$ | $(26.0-33.6)$ | <0.001 | $11.4$ | (9.2-14.0) | 0.585 | 46.1 | (42.5-49.7) | <0.001 | $58.3$ | (54.6-61.8) | <0.001 |  | $(2.6-5.2)$ | <0.001 |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 98.3 | (96.8-99.1) | 0.709 | 73.6 | (69.7-77.1) | 0.954 | 52.3 | (47.4-57.2) | 0.002 | 26.6 | (22.7-30.9) | 0.894 | 10.8 | (8.5-13.5) | 0.207 | 38.6 | (34.6-42.7) |  | 55.7 | (51.9-59.4) |  | 7.5 | (5.7-9.8) | 0.150 |
| Female | 847 | 98.5 | (97.0-99.2) | 0.70 | 73.5 | (70.0-76.7) | 0.954 | 44.7 | (41.1-48.4) | 0.002 | 26.9 | (26.9-22.9) | 0.894 | 12.7 | (10.1-16.0) | 0.20 | 46.8 | (43.3-50.3) |  | 54.9 | (50.7-59.0) |  | 5.6 | (4.1-7.6) |  |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 97.3 | (92.7-99.0) |  | 71.5 | (65.3-76.9) |  | 40.6 | (33.4-48.3) |  | 21.7 | (16.7-27.8) |  | 9.2 | (5.5-15.1) |  | 37.0 | (29.4-45.4) |  | 43.1 | (34.7-52.0) |  | 2.0 | (0.8-4.6) |  |
| Primary ${ }^{\text {b }}$ | 175 | 99.1 | (96.0-99.8) |  | 68.9 | (59.2-77.1) |  | 47.9 | (39.0-57.1) | 001 | 36.9 | (29.3-45.2) | 0.014 | 8.6 | (5.0-14.5) | 0.071 | 47.0 | (38.9-55.3) | 0.068 | 53.0 | (44.7-61.1) | <0.001 | 3.0 | (1.3-6.7) | <0.001 |
| Some secondary ${ }^{\text {c }}$ | 241 | 98.6 | (95.3-99.6) |  | 70.8 | (65.0-76.1) | 0.408 | 47.4 | (41.2-53.8) |  | 30.8 | (24.9-37.5) | 0.014 | 10.9 | (6.9-16.8) | 0.071 | 48.8 | (41.7-55.9) | 0.068 | 55.7 | (47.2-63.8) | <0.001 | 5.9 | (2.8-11.7) | <0.001 |
| SLC and above ${ }^{\text {d }}$ | 231 | 99.7 | (98.2-100.0) |  | 76.1 | (69.9-81.3) |  | 62.6 | (55.9-68.9) |  | 29.6 | (23.8-36.1) |  | 15.9 | (11.7-21.2) |  | 43.4 | (36.8-50.2) |  | 68.3 | (62.0-74.0) |  | 13.4 | (8.7-20.1) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 | 98.4 | (96.7-99.2) |  | 65.7 | (60.2-70.8) |  | 33.3 | (27.6-39.6) |  | 22.3 | (17.7-27.6) |  | 6.0 | (3.4-10.2) |  | 47.0 | (42.1-52.1) |  | 51.5 | (46.1-56.8) |  | 3.1 | (2.0-4.8) |  |
| Second | 353 | 97.9 | (95.3-99.1) |  | 70.7 | (65.2-75.8) |  | 44.4 | (38.9-50.1) |  | 27.5 | (22.6-32.9) |  | 8.1 | (5.6-11.4) |  | 41.8 | (35.7-48.1) |  | 50.2 | (44.1-56.3) |  | 2.9 | (1.7-4.9) |  |
| Middle | 301 | 97.3 | (94.2-98.8) | 0.362 | 73.7 | (67.0-79.5) | <0.001 | 47.9 | (40.6-55.3) | <0.001 | 25.7 | (18.1-35.2) | 0.117 | 11.9 | (8.3-16.8) | <0.001 | 39.0 | (33.5-44.7) | 0.086 | 50.1 | (42.6-57.7) | <0.001 | 4.3 | (2.5-7.2) | <0.001 |
| Fourth | 320 | 98.9 | (96.8-99.6) |  | 76.2 | (69.5-81.8) |  | 53.2 | (45.1-61.2) |  | 27.6 | (22.7-33.2) |  | 14.8 | (10.5-20.5) |  | 38.5 | (32.6-44.7) |  | 59.6 | (52.9-66.0) |  | 6.5 | (4.0-10.2) |  |
| Highest | 262 | 99.1 | (96.4-99.8) |  | 82.0 | (75.3-87.2) |  | 66.5 | (60.2-72.3) |  | 31.1 | (23.9-39.4) |  | 18.1 | (12.6-25.4) |  | 45.4 | (38.1-52.9) |  | 65.3 | (57.8-72.1) |  | 16.7 | (12.5-21.9) |  |

Table 4.6: Cont'd..

| Characteristics | N | Food made from grains, roots and tubers |  |  | Legumes and nuts |  |  | Dairy products |  |  | Meat/Fish |  |  | Eggs |  |  | Vitamin A rich fruits and vegetables |  |  | Other fruits and vegetables |  |  | Fortified complementaryfood |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | 99.2 | (94.5-99.9) |  | 79.1 | (70.5-85.7) |  | 76.9 | (65.5-85.3) |  | 16.5 | (11.0-24.1) |  | 7.3 | (3.7-13.8) |  | 51.3 | (42.5-60.1) |  | 69.5 | (61.4-76.5) |  | 15.3 | (9.9-22.9) |  |
| Hill Chhetri | 401 | 99.1 | (98.3-99.5) |  | 80.7 | (75.1-85.3) |  | 60.0 | (53.2-66.4) |  | 22.0 | (16.7-28.4) |  | 8.0 | (5.3-11.9) |  | 43.9 | (38.3-49.7) |  | 60.8 | (56.2-65.3) |  | 10.1 | (7.1-14.1) |  |
| Terai <br> Brahmin/Chhetri | 42 | (94.7) | (86.3-98.1) |  | (85.0) | (71.8-92.7) |  | (69.6) | (44.7-86.6) |  | (13.7) | (4.5-34.7) |  | (17.4) | (5.4-42.3) |  | (35.6) | (23.5-49.9) |  | (61.9) | (44.7-76.6) |  | (1.4) | (0.2-10.3) |  |
| Other Terai Caste | 139 | 97.3 | (93.7-98.9) |  | 81.8 | (73.9-87.7) |  | 52.5 | (45.1-59.7) |  | 8.8 | (4.4-16.8) |  | 5.6 | (2.2-13.5) |  | 32.6 | (19.1-49.7) |  | 46.1 | (33.9-58.9) |  | 1.9 | (0.6-6.0) |  |
| Hill Dalit | 272 | 100.0 | (0.0-100.0) | 0.001 | 74.1 | (64.0-82.1) | <0.001 | 40.9 | (33.0-49.4) | <0.001 | 37.0 | (29.1-45.6) | <0.001 | 11.9 | (7.9-17.5) | $<0.001$ | 45.2 | (37.4-53.3) | $<0.001$ | 46.7 | (39.5-54.0) | <0.001 | 5.7 | (2.4-13.0) | <0.001 |
| Terai Dalit | 89 | 94.1 | (85.1-97.8) |  | 73.9 | (61.9-83.1) |  | 40.7 | (28.2-54.5) |  | 14.0 | (8.2-22.8) |  | 4.0 | (1.0-14.3) |  | 37.1 | (29.8-45.0) |  | 42.7 | (30.7-55.6) |  | 5.5 | (1.3-19.7) |  |
| Newar | 51 | 99.5 | (96.1-99.9) |  | 73.5 | (54.6-86.5) |  | 55.7 | (42.0-68.6) |  | 44.3 | (31.5-58.0) |  | 41.1 | (29.0-54.3) |  | 64.4 | (48.1-77.9) |  | 66.5 | (50.3-79.5) |  | 17.8 | (10.2-29.3) |  |
| Hill Janajati | 385 | 99.3 | (98.8-99.5) |  | 62.5 | (57.7-67.0) |  | 31.2 | (28.1-34.5) |  | 41.4 | (35.0-48.1) |  | 14.8 | (11.6-18.6) |  | 49.9 | (44.8-54.9) |  | 55.1 | (50.6-59.5) |  | 3.6 | (2.3-5.5) |  |
| Terai Janajati | 120 | 97.1 | (91.4-99.1) |  | 62.8 | (50.9-73.3) |  | 34.5 | (24.5-46.2) |  | 33.8 | (22.9-46.8) |  | 13.9 | (7.2-25.3) |  | 20.1 | (14.1-27.7) |  | 56.8 | (43.9-68.9) |  | 8.3 | (3.4-18.8) |  |
| Muslim | 50 | 98.4 | (91.4-99.7) |  | 65.8 | (55.0-75.2) |  | 56.7 | (37.3-74.3) |  | 33.1 | (21.8-46.7) |  | 24.0 | (10.5-46.2) |  | 28.4 | (19.6-39.2) |  | 60.5 | (46.3-73.0) |  | 0.0 | - |  |
| Total | 1,709 | 98.4 | (97.5-98.9) |  | 73.5 | (70.5-76.3) |  | 48.8 | (45.2-52.3) |  | 26.7 | (23.5-30.2) |  | 11.7 | (9.7-14.0) |  | 42.4 | (39.6-45.3) |  | 55.3 | (51.9-58.7) |  | 6.6 | (5.3-8.2) |  | Note: N unweighted. All estimates account for weighting and complex sample design.

Figures in parentheses are based on $25-49$ unweigh.
Sample size might vary slightly due to missing data.
Response options read to participants.
Includes those who have never attended school.
${ }^{\text {In }}$ Includes those who have completed 0-5 years of school.
${ }^{5}$ Includes those who have completed 0-5 years of school.
${ }^{\text {I Includes those who have completed 6-9 years of school. }}$
${ }^{\text {d }}$ Includes those who have completed 10 and more years of
Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.
Table 4.7: Consumption of Specific Foods and Beverages among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sweet foods ${ }^{\text {a }}$ |  |  | Sugar sweetened beverages ${ }^{\text {b }}$ |  |  | Complementary foods ${ }^{\text {c }}$ |  |  | Tea |  |  | Tibetan Tea ${ }^{\text {d }}$ |  |  | Coffee |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ | \% | ( $95 \% \mathrm{Cl}$ ) | $\underset{\substack{\text { p-- } \\ \text { value }}}{ }$ |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | 73.7 | (68.0-78.6) |  | 21.0 | (16.2-26.8) |  | 6.8 | (3.5-12.8) |  | 48.5 | (44.1-52.9) |  | 1.6 | (1.0-2.5) |  | 0.6 | (0.1-2.9) |  |
| Central | 355 | 78.7 | (74.8-82.2) |  | 22.8 | (17.9-28.5) |  | 8.0 | (5.7-11.1) |  | 38.3 | (30.9-46.3) |  | 1.5 | (0.5-4.4) |  | 0.2 | (0.0-1.5) |  |
| Western | 294 | 77.1 | (71.8-81.7) | 0.010 | 28.1 | (23.7-33.0) | 0.004 | 5.7 | (4.2-7.8) | 0.368 | 63.9 | (59.6-68.0) | <0.001 | 1.4 | (1.2-1.6) | 0.358 | 0.6 | (0.5-0.7) | 0.507 |
| Mid-western | 351 | 68.0 | (61.5-73.9) |  | 15.5 | (12.2-19.4) |  | 4.4 | (2.8-6.9) |  | 29.9 | (23.1-37.8) |  | 0.6 | (0.1-4.0) |  | 0.7 | (0.2-2.8) |  |
| Far-western | 377 | 71.7 | (64.7-77.7) |  | 17.3 | (12.1-24.1) |  | 5.9 | (3.5-9.7) |  | 48.4 | (42.7-54.2) |  | 0.0 | - |  | 0.2 | (0.0-1.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 75.7 | (72.2-78.9) |  | 13.4 | (8.6-20.2) |  | 5.8 | (3.5-9.4) |  | 47.5 | (41.5-53.6) |  | 2.1 | (0.5-7.8) |  | 0.0 | - |  |
| Hill | 707 | 70.4 | (66.7-73.8) | 0.001 | 19.5 | (17.1-22.2) | 0.003 | 8.1 | (6.2-10.3) | 0.129 | 47.1 | (43.0-51.2) | 0.174 | 2.1 | (1.2-3.7) | 0.003 | 0.3 | (0.2-0.6) | 0.496 |
| Terai | 727 | 78.9 | (75.3-82.1) |  | 24.8 | (20.6-29.6) |  | 5.6 | (3.7-8.3) |  | 42.6 | (37.0-48.4) |  | 0.4 | (0.1-2.6) |  | 0.6 | (0.2-1.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 82.4 | (74.4-88.3) |  | 28.8 | (19.9-39.7) |  | 10.5 | (6.0-17.7) |  | 50.0 | (41.5-58.6) |  | 2.4 | (0.7-8.0) |  | 0.3 | (0.0-2.1) |  |
| Rural | 1,482 | 74.0 | (71.3-76.5) | 0.006 | 20.7 | (18.3-23.3) | 0.007 | 6.0 | (4.9-7.5) | 0.017 | 44.1 | (40.4-47.8) | 0.097 | 1.0 | (0.6-1.8) | 0.110 | 0.4 | (0.2-0.9) | 0.960 |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 31.0 | (20.0-44.8) |  | 4.1 | (1.7-9.4) |  | 29.1 | (19.7-40.7) |  | 10.3 | (5.2-19.3) |  | 0.0 | - |  | 0.0 | - |  |
| 9-11 | 88 | 46.8 | (36.0-57.9) |  | 7.4 | (2.9-17.2) |  | 18.9 | (12.4-27.7) |  | 21.5 | (13.6-32.2) |  | 0.0 |  |  | 0.0 | - |  |
| 12-17 | 182 | 69.3 | (62.1-75.7) |  | 18.8 | (14.1-24.5) |  | 7.6 | (3.8-14.8) |  | 37.5 | (29.5-46.2) |  | 0.0 |  |  | 0.9 | (0.8-1.1) |  |
| 18-23 | 166 | 75.8 | (68.2-82.0) | < 0.001 | 16.0 | (11.6-21.5) | <0.001 | 10.6 | (6.5-16.7) | <0.001 | 47.4 | (39.6-55.3) | <0.001 | 0.0 | - | 0.062 | 0.9 | (0.1-6.6) | 0.606 |
| 24-35 | 392 | 78.5 | (74.7-81.8) |  | 25.2 | (20.2-31.0) |  | 4.5 | (2.5-7.9) |  | 44.3 | (39.8-49.0) |  | 2.5 | (1.2-4.9) |  | 0.2 | (0.0-1.2) |  |
| 36-47 | 417 | 80.3 | (76.6-83.4) |  | 24.7 | (20.3-29.7) |  | 3.5 | (2.1-5.9) |  | 52.2 | (44.6-59.6) |  | 1.7 | (0.5-5.2) |  | 0.6 | (0.2-2.0) |  |
| 48-59 | 391 | 83.0 | (79.1-86.4) |  | 25.6 | (20.8-31.0) |  | 3.0 | (1.6-5.5) |  | 51.3 | (45.4-57.1) |  | 1.1 | (0.4-3.1) |  | 0.3 | (0.0-1.8) |  |
| 6-23 | 509 | 62.6 | (58.7-66.4) |  | 14.0 | (11.2-17.4) |  | 13.4 | (10.5-16.9) |  | 34.5 | (30.0-39.3) |  | 0.0 |  |  | 0.6 | (0.2-1.7) |  |
| 24-59 | 1,200 | 80.6 | (78.2-82.8) | <0.001 | 25.1 | (22.1-28.4) | <0.001 | 3.6 | (2.6-5.2) | <0.001 | 49.4 | (45.2-53.5) | <0.001 | 1.7 | (1.0-2.9) | 0.002 | 0.3 | (0.1-0.9) | 0.476 |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 75.1 | (72.0-78.1) |  | 22.9 | (19.9-26.2) |  | 7.5 | (5.7-9.8) |  | 45.3 | (41.6-48.9) |  | 1.4 | (0.7-2.6) |  | 0.1 | (0.0-0.5) |  |
| Female | 847 | 75.1 | (72.1-77.9) | 0.996 | 20.4 | (17.3-23.8) | 0.184 | 5.6 | (4.1-7.6) | 0.150 | 44.4 | (40.0-48.8) | 0.697 | 1.0 | (0.6-1.8) | 0.567 | 0.8 | (0.4-1.7) | 0.036 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 226 | 72.7 | (67.5-77.4) |  | 21.0 | (15.1-28.4) |  | 2.0 | (0.8-4.6) |  | 37.4 | (29.7-45.7) |  | 1.4 | (0.7-2.6) |  | 0.0 | - |  |
| Primary ${ }^{\text {f }}$ | 175 | 63.7 | (55.9-70.8) | <0.001 | 14.0 | (9.5-20.0) |  | 3.0 | (1.3-6.7) |  | 41.8 | (32.8-51.3) | 0.003 | 1.3 | (0.2-8.1) |  | 0.6 | (0.1-4.4) |  |
| Some secondary ${ }^{\text {8 }}$ | 241 | 80.8 | (75.4-85.3) | <0.001 | 16.4 | (12.4-21.2) | 0.001 | 5.9 | (2.8-11.7) |  | 50.3 | (43.9-56.6) | 0.003 | 2.1 | (0.9-4.7) | 0.848 | 0.7 | (0.7-0.8) |  |
| SLC and above ${ }^{\text {h }}$ | 231 | 83.8 | (79.3-87.4) |  | 28.0 | (21.8-35.1) |  | 13.4 | (8.7-20.1) |  | 52.4 | (45.0-59.6) |  | 1.1 | (0.2-5.4) |  | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 | 60.5 | (55.4-65.4) |  | 8.0 | (5.0-12.6) |  | 3.1 | (2.0-4.8) |  | 32.4 | (27.9-37.3) |  | 1.9 | (1.2-2.8) |  | 0.0 | - |  |
| Second | 353 | 74.9 | (69.8-79.4) |  | 17.1 | (13.0-22.0) |  | 2.9 | (1.7-4.9) |  | 44.8 | (37.5-52.3) |  | 1.2 | (1.0-1.5) |  | 1.0 | (0.5-2.1) |  |
| Middle | 301 | 79.2 | (72.3-84.8) | <0.001 | 23.2 | (17.8-29.6) | <0.001 | 4.3 | (2.5-7.2) | <0.001 | 45.0 | (38.1-52.1) | <0.001 | 0.1 | (0.0-0.9) | 0.131 | 0.5 | (0.1-3.5) | 0.233 |
| Fourth | 320 | 79.0 | (73.9-83.3) |  | 27.1 | (20.9-34.2) |  | 6.5 | (4.0-10.2) |  | 48.9 | (42.3-55.6) |  | 0.9 | (0.1-6.4) |  | 0.0 |  |  |
| Highest | 262 | 83.3 | (77.4-87.9) |  | 34.7 | (26.7-43.6) |  | 16.7 | (12.5-21.9) |  | 54.3 | (47.5-60.9) |  | 1.9 | (0.5-7.1) |  | 0.7 | (0.2-2.5) |  |

Table 4.7: Cont'd...

| Characteristics |  | N | Sweet foods ${ }^{\text {a }}$ |  |  | Sugar sweetened beverages ${ }^{\text {b }}$ |  |  | Complementary foods ${ }^{\text {c }}$ |  |  | Tea |  |  | Tibetan Tea ${ }^{\text {d }}$ |  |  | Coffee |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin |  |  | 158 | 77.9 | (71.2-83.4) |  | 29.8 | (23.5-36.9) |  | 15.3 | (9.9-22.9) |  | 58.4 | (48.8-67.4) |  | 1.2 | (0.2-8.2) |  | 0.8 | (0.1-5.3) |  |
| Hill Chhetri |  | 401 | 75.9 | (70.2-80.8) |  | 21.4 | (16.8-26.7) |  | 10.1 | (7.1-14.1) |  | 53.0 | (47.6-58.4) |  | 0.8 | (0.2-2.4) |  | 0.3 | (0.1-1.4) |  |
| Terai Brahmin/Chhetri |  | 42 | (82.9) | (71.9-90.2) |  | (22.3) | (12.5-36.5) |  | (1.4) | (0.2-10.3) |  | (67.7) | (56.2-77.4) |  | (0.0) | - |  | (0.0) | - |  |
| Other Terai Caste |  | 139 | 80.9 | (75.3-85.5) |  | 18.3 | (12.4-26.1) |  | 1.9 | (0.6-6.0) |  | 37.3 | (24.7-52.0) |  | 0.0 | - |  | 0.6 | (0.1-4.7) |  |
| Hill Dalit |  | 272 | 71.9 | (65.7-77.3) | 0.059 | 17.1 | (11.2-25.1) | 0.059 | 5.7 | (2.4-13.0) | <0.001 | 42.5 | (35.6-49.7) | <0.001 | 1.4 | (1.1-1.7) | 0.022 | 0.0 | - | 0.694 |
| Terai Dalit |  | 89 | 67.5 | (54.3-78.4) |  | 17.6 | (11.7-25.5) |  | 5.5 | (1.3-19.7) |  | 34.6 | (25.4-45.1) |  | 0.0 | - |  | 0.0 | - | 0.694 |
| Newar |  | 51 | 81.0 | (66.9-90.0) |  | 31.5 | (18.2-48.8) |  | 17.8 | (10.2-29.3) |  | 57.9 | (41.2-73.0) |  | 3.5 | (0.5-21.9) |  | 1.1 | (0.2-6.9) |  |
| Hill Janajati |  | 385 | 71.5 | (67.5-75.1) |  | 23.1 | (18.6-28.3) |  | 3.6 | (2.3-5.5) |  | 42.0 | (36.2-48.0) |  | 2.1 | (1.2-3.8) |  | 0.5 | (0.4-0.5) |  |
| Terai Janajati |  | 120 | 74.7 | (63.7-83.3) |  | 23.3 | (15.7-33.0) |  | 8.3 | (3.4-18.8) |  | 28.0 | (18.8-39.7) |  | 0.0 | - |  | 0.0 | - |  |
| Muslim |  | 50 | 76.5 | (63.4-85.9) |  | 18.2 | (10.3-29.9) |  | 0.0 | - |  | 43.7 | (30.7-57.6) |  | 5.1 | (0.8-26.8) |  | 1.6 | (0.2-12.1) |  |
|  | Total | 1,709 | 75.1 | (72.7-77.4) |  | 21.8 | (19.3-24.4) |  | 6.6 | (5.3-8.2) |  | 44.8 | (41.4-48.3) |  | 1.2 | (0.7-2.1) |  | 0.4 | (0.2-0.8) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice-cream.
${ }^{\text {b }}$ buch as soft drinks, juice drinks, and other drinks with added sugar purchased or made at home.
${ }^{\mathrm{d}}$ Tea mixed with ghee and salt.
eIncludes those who have never attended school.
Includes those who have completed 0-5 years of school.
sIncludes those who have completed 6-9 years of school.
hIncludes those who have completed 10 and more years of
${ }^{h}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

| Characteristics | N | Cooking Oil |  |  | Vegetable Ghee |  |  | Other Fats (Butter, Animal fat, Animal ghee) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | 93.6 | (90.2-95.9) |  | 2.1 | (0.6-7.2) |  | 20.6 | (16.1-25.9) |  |
| Central | 355 | 94.0 | (89.0-96.8) |  | 1.8 | (1.0-3.2) |  | 14.2 | (10.3-19.5) |  |
| Western | 294 | 95.8 | (91.8-97.9) | 0.644 | 2.5 | (1.4-4.4) | 0.704 | 35.0 | (29.6-40.8) | $<0.001$ |
| Mid-western | 351 | 94.4 | (90.8-96.6) |  | 1.9 | (0.7-4.9) |  | 11.7 | (6.2-21.0) |  |
| Far-western | 377 | 95.7 | (92.7-97.5) |  | 0.4 | (0.0-2.5) |  | 25.4 | (19.2-32.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 97.6 | (94.8-98.9) |  | 0.0 | - |  | 27.5 | (19.4-37.4) |  |
| Hill | 707 | 96.4 | (94.5-97.7) | <0.001 | 1.2 | (0.7-2.1) | 0.035 | 26.3 | (22.5-30.4) | <0.001 |
| Terai | 727 | 92.4 | (88.9-94.8) |  | 2.6 | (1.5-4.5) |  | 13.8 | (10.7-17.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 94.0 | (89.2-96.7) |  | 1.2 | (0.4-4.2) |  | 27.7 | (21.7-34.5) |  |
| Rural | 1,482 | 94.5 | (92.5-96.0) | 0.817 | 1.9 | (1.2-3.1) | 0.533 | 18.9 | (16.4-21.6) | 0.002 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 59.4 | (47.2-70.6) |  | 4.1 | (0.8-17.9) |  | 12.3 | (6.1-23.2) |  |
| 9-11 | 88 | 67.9 | (51.7-80.6) |  | 3.0 | (0.4-18.4) |  | 24.4 | (17.1-33.6) |  |
| 12-17 | 182 | 94.7 | (89.3-97.4) |  | 0.3 | (0.0-2.4) |  | 20.5 | (15.7-26.4) |  |
| 18-23 | 166 | 99.3 | (97.1-99.8) | <0.001 | 0.0 | - | 0.143 | 28.3 | (21.2-36.7) | 0.038 |
| 24-35 | 392 | 96.1 | (93.0-97.9) |  | 2.7 | (1.3-5.4) |  | 19.5 | (16.0-23.5) |  |
| 36-47 | 417 | 97.7 | (95.1-98.9) |  | 2.4 | (1.1-4.9) |  | 20.0 | (16.3-24.4) |  |
| 48-59 | 391 | 99.2 | (97.3-99.8) |  | 1.4 | (0.5-3.9) |  | 17.1 | (13.6-21.3) |  |
| 6-23 | 509 | 87.1 | (82.0-90.9) |  | 1.2 | (0.4-3.6) |  | 22.6 | (19.0-26.5) |  |
| 24-59 | 1,200 | 97.7 | (96.4-98.5) | <0.001 | 2.1 | (1.3-3.4) | 0.174 | 18.9 | (16.5-21.5) | 0.071 |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 93.4 | (90.5-95.5) | 0.056 | 1.8 | (1.2-2.8) | 0.949 | 20.5 | (17.4-23.9) | 0.586 |
| Female | 847 | 95.6 | (93.6-97.0) |  | 1.9 | (0.9-3.7) |  | 19.4 | (16.6-22.7) |  |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 92.6 | (87.5-95.8) |  | 2.0 | (0.5-7.2) |  | 9.2 | (6.0-13.8) |  |
| Primary ${ }^{\text {b }}$ | 175 | 96.1 | (91.3-98.3) | 0.254 | 1.5 | (0.4-5.8) | 0.542 | 13.0 | (9.1-18.1) | <0.001 |
| Some secondary ${ }^{\text {c }}$ | 241 | 93.2 | (87.1-96.5) |  | 1.4 | (0.3-6.4) | 0.542 | 24.2 | (18.7-30.8) |  |
| SLC and above ${ }^{\text {d }}$ | 231 | 95.9 | (91.6-98.1) |  | 0.3 | (0.0-2.0) |  | 33.7 | (26.8-41.4) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 | 95.4 | (92.6-97.2) |  | 1.0 | (0.3-3.3) |  | 14.7 | (10.7-19.9) |  |
| Second | 353 | 96.0 | (93.6-97.5) |  | 3.4 | (1.8-6.5) |  | 19.2 | (15.3-24.0) |  |
| Middle | 301 | 93.0 | (87.4-96.2) | 0.361 | 2.4 | (0.8-7.3) | 0.122 | 16.6 | (12.2-22.1) | <0.001 |
| Fourth | 320 | 94.3 | (91.1-96.4) |  | 1.6 | (0.6-4.4) |  | 17.6 | (14.0-21.9) |  |
| Highest | 262 | 93.4 | (88.4-96.4) |  | 0.9 | (0.2-3.7) |  | 32.6 | (27.3-38.4) |  |

Table 4.8: Cont'd..

| Characteristics |  | N | Cooking Oil |  |  | Vegetable Ghee |  |  | Other Fats (Butter, Animal fat, Animal ghee) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin |  |  | 158 | 90.8 | (84.3-94.8) |  | 0.8 | (0.6-1.0) |  | 39.6 | (31.4-48.6) |  |
| Hill Chhetri |  | 401 | 96.2 | (93.2-97.9) |  | 0.3 | (0.0-2.1) |  | 32.5 | (27.0-38.4) |  |
| Terai Brahmin/Chhetri |  | 42 | (88.9) | (74.9-95.5) |  | (5.2) | (1.9-13.6) |  | (39.2) | (17.4-66.4) |  |
| Other Terai Caste |  | 139 | 92.3 | (83.0-96.7) |  | 4.5 | (2.4-8.3) |  | 5.5 | (3.1-9.7) |  |
| Hill Dalit |  | 272 | 96.8 | (93.2-98.5) | 0.003 | 1.8 | (0.5-6.4) | 0.011 | 17.6 | (11.9-25.3) | <0.001 |
| Terai Dalit |  | 89 | 90.1 | (74.2-96.7) |  | 2.2 | (0.4-11.1) |  | 7.7 | (3.1-18.0) | <0.001 |
| Newar |  | 51 | 98.9 | (95.0-99.7) |  | 0.0 | - |  | 35.0 | (26.5-44.4) |  |
| Hill Janajati |  | 385 | 96.7 | (94.5-98.1) |  | 1.2 | (0.6-2.4) |  | 18.5 | (15.0-22.7) |  |
| Terai Janajati |  | 120 | 91.8 | (84.3-95.9) |  | 2.1 | (0.3-13.8) |  | 4.3 | (1.1-15.6) |  |
| Muslim |  | 50 | 96.7 | (90.7-98.9) |  | 3.2 | (0.7-12.6) |  | 4.8 | (1.4-15.1) |  |
|  | Total | 1,709 | 94.5 | (92.6-95.9) |  | 1.8 | (1.2-2.8) |  | 20.0 | (17.6-22.7) |  |

[^15]Table 4.9: Consumption of Foods Made at Home with Purchased Maida or Atta Wheat Flour Yesterday and During the Last 7 Days among Children 6 -59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Intake Yesterday |  |  | Median number of days of intake during last 7 days $^{a}$ |  | Number of days consumed during last 7 days ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | 1-2 days | 3-4 days |  |  | 5-6 days |  |  | 7 days/every day |  |  |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |  |  | Median | (95\% CI) | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p}^{-} \\ \text {value } \end{gathered}$ | \% | (95\% CI) | p-value |
| Developmental |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | 14.0 | (10.1-19.0) |  | 3 | (2.5-3.5) | 46.4 | (34.3-59.0) |  | 35.6 | (24.5-48.6) |  | 10.2 | (4.5-21.5) |  | 7.8 | (2.9-19.2) |  |
| Central | 355 | 16.1 | (12.1-21.0) |  | 2 | (1.0-3.0) | 50.3 | (39.2-61.4) |  | 18.2 | (11.0-28.5) |  | 14.2 | (7.5-25.4) |  | 17.3 | (10.1-27.9) |  |
| Western | 294 | 26.8 | (21.6-32.6) | <0.001 | 2 | (1.5-2.5) | 50.7 | (41.5-59.8) | 0.597 | 23.2 | (16.5-31.8) | 0.001 | 9.9 | (5.7-16.9) | 0.735 | 16.2 | (10.3-24.5) | $<0.001$ |
| Mid-western | 351 | 9.8 | (6.8-14.0) |  | 3 | (2.5-3.5) | 41.5 | (27.7-56.7) |  | 45.9 | (31.7-60.9) |  | 9.6 | (3.4-24.3) |  | 3.0 | (0.4-18.4) |  |
| Far-western | 377 | 12.2 | (9.2-16.0) |  | 6 | (4.0-8.0) | 31.2 | (17.6-48.9) |  | 15.0 | (6.2-32.0) |  | 6.9 | (1.9-22.0) |  | 46.9 | (30.5-64.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 6.0 | (3.5-10.1) |  | 2 | (1.0-3.0) | 54.6 | (35.4-72.5) |  | 36.3 | (20.4-56.0) |  | 0.0 | - |  | 9.1 | (2.2-30.4) |  |
| Hill | 707 | 12.3 | (9.7-15.6) | $<0.001$ | 2 | (1.0-3.0) | 59.9 | (50.3-68.7) | 0.001 | 23.5 | (16.6-32.3) | 0.534 | 5.9 | (2.9-11.7) | 0.004 | 10.7 | (6.0-18.3) | 0.115 |
| Terai | 727 | 20.9 | (17.6-24.7) |  | 3 | (2.0-4.0) | 41.2 | (34.0-48.8) |  | 26.1 | (20.0-33.4) |  | 15.2 | (10.0-22.4) |  | 17.4 | (12.2-24.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 23.3 | (16.8-31.3) |  | 3 | (1.0-5.0) | 42.3 | (30.7-54.8) |  | 28.6 | (18.2-41.9) |  | 14.7 | (6.6-29.6) |  | 14.5 | (7.1-27.1) |  |
| Rural | 1,482 | 15.2 | (13.0-17.6) | . 002 | 3 | (2.5-3.5) | 49.9 | (43.4-56.5) | 177 | 24.7 | (19.6-30.5) | . 407 | 10.5 | (7.0-15.6) | 266 | 14.9 | (10.7-20.3) | . 955 |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 5.9 | (2.0-16.3) |  | 2 | (-0.9-4.9) | 51.4 | (18.5-83.1) |  | 25.8 | (5.7-66.6) |  | 0.0 | - |  | 22.8 | (4.5-64.8) |  |
| 9-11 | 88 | 13.3 | (6.0.7-25) |  | 2 | (1.0-3.0) | 57.0 | (30.9-79.7) |  | 22.9 | (6.8-54.7) |  | 14.8 | (3.5-45.2) |  | 5.3 | (1.2-20.2) |  |
| 12-17 | 182 | 10.5 | (6.1-17.4) |  | 3 | (2.0-4.0) | 42.2 | (22.9-64.3) |  | 33.0 | (17.0-54.3) |  | 14.7 | (5.1-35.4) |  | 10.1 | (2.2-35.9) |  |
| 18-23 | 166 | 19.3 | (12.6-28.4) | 0.023 | 2 | (0.5-3.5) | 54.5 | (37.1-70.8) | 0.681 | 27.1 | (14.0-45.8) | 0.025 | 5.2 | (1.1-21.6) | 0.253 | 13.3 | (5.3-29.6) | 0.100 |
| 24-35 | 392 | 16.5 | (12.2-21.8) |  | 3 | (2.5-3.5) | 47.8 | (36.3-59.6) |  | 35.7 | (25.3-47.5) |  | 7.3 | (3.1-16.5) |  | 9.2 | (3.8-20.5) |  |
| 36-47 | 417 | 18.5 | (14.3-23.6) |  | 2 | (1.0-3.0) | 50.6 | (39.1-62.1) |  | 14.0 | (8.7-21.7) |  | 13.6 | (6.7-25.8) |  | 21.7 | (13.2-33.6) |  |
| 48-59 | 391 | 17.5 | (13.3-22.8) |  | 3 | (2.0-4.0) | 42.9 | (32.0-54.5) |  | 24.5 | (15.9-35.8) |  | 15.5 | (8.0-28.1) |  | 17.1 | (9.9-27.9) |  |
| 6-23 | 509 | 13.2 | (9.9-17.5) |  | 2 | (1.5-2.5) | 51.5 | (40.0-62.8) |  | 27.7 | (18.4-39.4) |  | 9.4 | (4.4-18.7) |  | 11.4 | (6.0-20.8) |  |
| 24-59 | 1,200 | 17.5 | (15.0-20.4) | 0.025 | 3 | (2.5-3.5) | 47.0 | (40.4-53.8) | 0.390 | 24.7 | (19.5-30.8) | 0.482 | 12.2 | (8.0-18.2) | 0.334 | 16.0 | (11.4-22.0) | 0.230 |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 18.0 | (15.0-21.5) |  | 2 | (1.5-2.5) | 50.6 | (42.4-58.7) |  | 22.6 | (16.6-30.1) |  | 13.2 | (8.2-20.7) |  | 13.6 | (8.8-20.3) | 0.423 |
| Female | 847 | 14.2 | (11.5-17.4) |  | 3 | (2.5-3.5) | 45.4 | (37.3-53.8) | 0.283 | 29.1 | (22.2-37.0) | 1 | 9.2 | (5.2-15.9) | 4 | 16.3 | (10.7-23.9) | 0.423 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 226 | 18.6 | (12.6-26.5) |  | 3 | (2.0-4.0) | 43.9 | (26.1-63.4) |  | 31.5 | (17.5-50.1) |  | 5.4 | (0.8-30.0) |  | 19.1 | (7.4-41.1) |  |
| Primary ${ }^{\text {c }}$ | 175 | 14.7 | (9.5-22.0) | 0.419 | 3 | (1.5-4.5) | 39.8 | (23.4-58.8) | 0.083 | 29.3 | (15.8-47.7) | 0.530 | 6.7 | (1.6-23.8) | 0335 | 24.2 | (11.7-43.5) | 0.104 |
| Some secondary ${ }^{\text {d }}$ | 241 | 13.6 | (9.3-19.4) | 0.419 | 2 | (1.5-2.5) | 50.3 | (35.4-65.2) | 0.083 | 25.8 | (15.2-40.3) | 0.530 | 13.4 | (5.4-29.6) | 0.335 | 10.5 | (4.1-24.3) | 0.104 |
| SLC and above ${ }^{\text {e }}$ | 231 | 17.9 | (12.6-24.8) |  | 2 | (1.0-3.0) | 62.0 | (48.1-74.1) |  | 20.4 | (11.7-33.1) |  | 8.3 | (3.0-20.8) |  | 9.4 | (3.6-22.0) |  |

Table 4.9: Cont'd.

| Characteristics | N | Intake Yesterday ${ }^{\text {a }}$ |  |  | Median number of days of intake during last 7 days $^{\text {a }}$ |  | Number of days consumed during last 7 days ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | 1-2 days | 3-4 days |  |  | 5-6 days |  |  | 7 days/every day |  |  |
|  |  | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |  |  | Median | (95\% CI) | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \\ \hline \end{gathered}$ | \% | (95\% CI) | p-value |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 |  | (6.0-12.8) |  | 3 | (2.5-3.5) | 29.6 | (16.6-47.1) |  | 47.8 | (30.8-65.4) |  | 3.5 | (0.5-21.1) |  | 19.1 | (7.8-39.8) |  |
| Second | 353 | 16.4 | (12.0-22.0) | <0.001 | 3 | (1.5-4.5) | 41.5 | (27.6-56.9) | 0.037 | 20.7 | (11.3-34.8) | 0.007 | 18.0 | (7.5-37.1) | 0.062 | 19.8 | (10.2-34.9) | 0.074 |
| Middle | 301 | 19.8 | (14.8-25.9) | <0.001 | 3 | (2.5-3.5) | 45.5 | (33.7-57.7) | 0.037 | 28.5 | (19.1-40.3) | 0.007 | 14.3 | (7.8-25.0) | 0.062 | 11.7 | (5.6-22.8) | 0.074 |
| Fourth | 320 | 15.5 | (11.5-20.4) |  | 2 | (1.5-2.5) | 54.2 | (42.3-65.7) |  | 17.9 | (10.9-28.0) |  | 6.8 | (2.8-15.6) |  | 21.1 | (12.3-33.6) |  |
| Highest | 262 | 21.5 | (15.9-28.3) |  | 2 | (1.5-2.5) | 54.1 | (43.2-64.7) |  | 24.4 | (16.2-35.0) |  | 11.7 | (5.9-22.1) |  | 9.8 | (5.0-18.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 |  | (14.3-28.9) |  | 2 |  | 52.0 | (37.8-65.9) |  | 24.3 | (13.9-39.1) |  | 6.9 | (2.5-18.1) |  | 16.7 | (8.8-29.4) |  |
| Hill Chhetri | 401 |  | (7.5-14.5) |  | 2 |  | 56.3 | (41.9-69.8) |  | 23.9 | (14.2-37.4) |  | 9.1 | (3.5-21.8) |  | 10.6 | (4.7-22.5) |  |
| Terai Brahmin | 42 | (36.8) | (21.0-56.1) |  | 4 |  | (21.3) | (7.7-46.5) |  | (55.3) | (28.8-79.2) |  | (23.4) | (6.8-56.3) |  | (0.0) | - |  |
| Other Terai Caste | 139 | 27.1 | (19.7-36.0) |  | 5 |  | 27.8 | (15.8-44.1) |  | 17.4 | (8.5-32.5) |  | 28.6 | (16.0-45.6) |  | 26.2 | (14.1-43.3) |  |
| Hill Dalit | 272 |  | (5.1-13.3) | $<0.001$ | 2 |  | 63.1 | (44.6-78.4) | $<0.001$ | 28.8 | (15.7-46.8) | 0.100 | 3.9 | (0.5-23.4) | $<0.001$ | 4.1 | (0.6-24.2) | <0.001 |
| Terai Dalit | 89 | 19.0 | (11.9-29.0) |  | 3 |  | 39.4 | (21.7-60.5) |  | 26.5 | (12.4-47.8) |  | 11.3 | (2.9-35.6) |  | 22.8 | (10.2-43.4) |  |
| Newar | 51 | 12.9 | (5.7-26.5) |  | 1 |  | 68.3 | (44.7-85.2) |  | 29.5 | (13.2-53.6) |  | 2.2 | (0.3-14.4) |  | 0.0 | - |  |
| Hill Janajati | 385 | 10.6 | (7.3-15.2) |  | 2 |  | 62.4 | (48.4-74.6) |  | 22.0 | (13.1-34.6) |  | 6.7 | (2.4-17.1) |  | 8.9 | (3.5-20.7) |  |
| Terai Janajati | 120 | 12.1 | (6.1-22.5) |  | 2 |  | 56.5 | (32.9-77.6) |  | 26.5 | (11.3-50.6) |  | 0.0 | - |  | 16.9 | (4.1-49.4) |  |
| Muslim | 50 | 36.5 | (23.6-51.7) |  | 3 |  | 32.3 | (15.9-54.6) |  | 26.5 | (10.4-53.0) |  | 11.0 | (1.6-48.3) |  | 30.2 | (13.5-54.5) |  |
| Total | 1,709 | 16.2 | (14.1-18.6) |  | 3 |  | 48.3 | (42.4-54.1) |  | 25.5 | (20.8-30.9) |  | 11.4 | (7.9-16.3) |  | 14.8 | (11.0-19.6) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with cautio <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Among those who consume the foods. <br> ${ }^{\text {b }}$ Includes those who have never attended school. <br> Includes those who have completed 0-5 years of school. <br> ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 4.10: Consumption of Uncooked Rice, Starch or Ice and Any PICA during the Last 7 days among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumption of Uncooked Rice, Starch or Ice |  |  | Any PICA syndrome ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | P-value | \% | (95\% CI) | P-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 332 \\ & 355 \\ & 294 \\ & 351 \\ & 377 \end{aligned}$ | $\begin{array}{r} 5.5 \\ 5.0 \\ 5.0 \\ 12.5 \\ 26.5 \end{array}$ | $\begin{array}{r} (2.8-10.4) \\ (3.9-6.4) \\ (2.8-8.7) \\ (9.6-16.1) \\ (20.8-33.1) \end{array}$ | <0.001 | $\begin{array}{r} 9.1 \\ 11.9 \\ 10.5 \\ 19.4 \\ 29.7 \end{array}$ | $\begin{array}{r} (5.7-14.2) \\ (8.9-15.8) \\ (7.4-14.7) \\ (15.2-24.3) \\ (24.1-36.0) \end{array}$ | <0.001 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 275 \\ & 707 \\ & 727 \\ & \hline \end{aligned}$ | $\begin{array}{r} 18.0 \\ 6.2 \\ 8.6 \\ \hline \end{array}$ | $\begin{array}{r} (12.9-24.6) \\ (4.8-8.0) \\ (6.7-10.9) \\ \hline \end{array}$ | $<0.001$ | $\begin{aligned} & 21.1 \\ & 11.3 \\ & 15.0 \\ & \hline \end{aligned}$ | $\begin{array}{r} (16.1-27.1) \\ (9.5-13.3) \\ (11.9-18.6) \\ \hline \end{array}$ | 0.004 |
| Location Urban Rural | $\begin{array}{r} 227 \\ 1,482 \end{array}$ | $\begin{array}{r} 10.8 \\ 8.0 \end{array}$ | $\begin{array}{r} (6.8-16.6) \\ (6.7-9.5) \\ \hline \end{array}$ | 0.155 | $\begin{aligned} & 15.2 \\ & 13.7 \end{aligned}$ | $\begin{aligned} & (10.9-20.8) \\ & (11.7-16.0) \\ & \hline \end{aligned}$ | 0.541 |
| Age, months <br> $6-8$ <br> $9-11$ <br> $12-17$ <br> $18-23$ <br> $24-35$ <br> $36-47$ <br> $48-59$ <br>  <br> $6-23$ <br> $24-59$ | $\begin{array}{r} 73 \\ 88 \\ 182 \\ 166 \\ 392 \\ 417 \\ 391 \\ 509 \\ 5,200 \\ \hline \end{array}$ | $\begin{aligned} & 3.2 \\ & 2.3 \\ & 5.5 \\ & 9.8 \\ & 9.7 \\ & 9.6 \\ & 8.6 \\ & 6.1 \\ & 9.3 \end{aligned}$ | $\begin{array}{r} (1.2-8.7) \\ (0.8-6.1) \\ (3.0-10.2) \\ (6.0-15.7) \\ (6.7-13.8) \\ (6.9-13.4) \\ (5.6-12.8) \\ (4.4-8.5) \\ (7.7-11.2) \\ \hline \end{array}$ | $\begin{aligned} & 0.100 \\ & 0.032 \end{aligned}$ | $\begin{aligned} & 10.1 \\ & 18.6 \\ & 14.2 \\ & 13.4 \\ & 15.1 \\ & 12.2 \\ & 13.1 \\ & 15.0 \\ & 16.4 \end{aligned}$ | $\begin{array}{r} (5.3-18.4) \\ (10.9-29.8) \\ (9.0-21.5) \\ (11.3-15.8) \\ (11.6-19.3) \\ (9.0-16.3) \\ (9.3-18.1) \\ (12.2-18.4) \\ (12.7-20.9) \end{array}$ | $\begin{aligned} & 0.571 \\ & \\ & 0.382 \end{aligned}$ |
| Sex <br> Male <br> Female | $\begin{aligned} & 862 \\ & 847 \end{aligned}$ | $\begin{aligned} & 7.8 \\ & 8.9 \end{aligned}$ | $\begin{aligned} & (6.0-10.0) \\ & (7.1-11.2) \end{aligned}$ | 0.361 | $\begin{aligned} & 12.4 \\ & 15.7 \end{aligned}$ | $\begin{aligned} & (10.1-15.1) \\ & (13.1-18.7) \end{aligned}$ | 0.054 |
| Maternal Education <br> No education ${ }^{\text {b }}$ <br> Primary ${ }^{\text {c }}$ <br> Some secondary ${ }^{\text {d }}$ SLC and above ${ }^{e}$ | $\begin{aligned} & 226 \\ & 175 \\ & 241 \\ & 231 \end{aligned}$ | $\begin{array}{r} 10.8 \\ 8.9 \\ 6.4 \\ 5.4 \end{array}$ | $\begin{array}{r} (7.8-14.8) \\ (5.3-14.5) \\ (3.5-11.6) \\ (3.2-9.1) \end{array}$ | 0.134 | $\begin{array}{r} 18.8 \\ 23.4 \\ 11.1 \\ 7.9 \end{array}$ | $\begin{array}{r} (13.8-25.1) \\ (17.1-31.2) \\ (7.1-17.0) \\ (5.1-12.0) \end{array}$ | <0.001 |
| Wealth Quintile Lowest Second Middle Fourth Highest | $\begin{aligned} & 473 \\ & 353 \\ & 301 \\ & 320 \\ & 262 \\ & \hline \end{aligned}$ | $\begin{array}{r} 10.9 \\ 6.3 \\ 7.6 \\ 10.8 \\ 5.7 \\ \hline \end{array}$ | $\begin{array}{r} (8.6-13.6) \\ (4.4-9.0) \\ (5.0-11.4) \\ (7.1-16.0) \\ (3.7-8.8) \\ \hline \end{array}$ | 0.028 | $\begin{array}{r} 15.9 \\ 14.2 \\ 16.0 \\ 13.8 \\ 9.4 \end{array}$ | $\begin{array}{r} (13.4-18.9) \\ (10.6-18.8) \\ (11.6-21.8) \\ (9.5-19.6) \\ (6.3-13.7) \\ \hline \end{array}$ | 0.078 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 158 \\ 401 \\ 42 \\ 139 \\ 272 \\ 89 \\ 51 \\ 385 \\ 120 \\ 50 \\ \hline \end{array}$ | 9.9 9.6 $(0.7)$ 5.8 10.5 2.8 6.0 7.4 15.3 13.5 | $\begin{array}{r} (6.2-15.4) \\ (6.5-13.9) \\ (0.1-5.2) \\ (3.8-8.8) \\ (7.4-14.6) \\ (0.8-9.4) \\ (1.8-18.6) \\ (5.1-10.5) \\ (9.4-23.9) \\ (6.3-26.5) \\ \hline \end{array}$ | 0.001 | $\begin{array}{r} 12.8 \\ 13.7 \\ (2.2) \\ 13.9 \\ 13.6 \\ 10.9 \\ 9.5 \\ 12.6 \\ 25.0 \\ 26.2 \\ \hline \end{array}$ | $(8.3-19.3)$ $(10.3-17.9)$ $(0.4-10.7)$ $(8.1-22.7)$ $(10.1-18.2)$ $(4.8-22.9)$ $(3.3-24.4)$ $(10.0-15.8)$ $(14.2-40.2)$ $(15.1-41.5)$ | 0.001 |
|  | 1,709 | 8.3 | (7.1-9.8) |  | 13.9 | (12.1-15.9) |  |

[^16]
## Dietary Diversity, Intake of Specific Foods and PICA

 Syndrome among Children 6-9 Years, Adolescent Boys 10-19 Years, Adolescent Girls 10-19 Years and Women of Reproductive AgeThis chapter describes the types of foods consumed by children 6-9 years, adolescent boys 1019 years, adolescent girls 10-19 years and women of reproductive age 15-49 years of age in the previous day and night of the survey. Dietary diversity and PICA syndrome among target groups were also collected. The minimum dietary diversity for children 6-9 years, adolescents 10-19 years and women 15-49 years were defined as consuming food items from at least five out of ten defined food groups the previous day or night. The 10 food groups are: Grains, white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetables; Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits (FANTA, 2016). PICA syndrome is defined as consuming nonfood item such as clay, earth or termite mound, uncooked rice, starch or ice.

### 5.1 Dietary Diversity among Children 6-9 Years

Among the children 6-9 years, overall, only four in ten (42 percent) had achieved the minimum dietary diversity the previous day. Proportion of children meeting the minimum dietary diversity was lower in rural area than compared to urban area ( 40 percent versus 55 percent). Further, it was 31 percent among children from the lowest wealth quintile and 57 percent among children in the highest wealth quintile group. Among children from the Hill Brahmin caste group, 62 percent achieved the minimum dietary diversity (Table 5.1).

### 5.2 Types of Foods Consumed by Children 6-9 Years in the Preceding Day of the Survey

Table 5.2 shows the types of foods consumed by children 6-9 years in the previous day. All children had consumed food made from grain followed by foods made from roots and tubers ( 81 percent), legumes ( 74 percent), other vegetables ( 67 percent), dairy products ( 44 percent), dark green leafy vegetables ( 41 percent) and other fruits ( 36 percent). Almost a quarter (24 percent) had consumed meat and 12 percent consumed eggs. Consumption of fish and organ meat was not common and each was consumed by around five percent of children. Consumption of snails, larva or other insects was almost negligible in the country where only 3 children 6-9 years out of 1138 reported consuming them (data not shown).

Overall, three quarters (76 percent) of children 6-9 years consumed sweet foods such as candy, chocolates, cakes, or biscuits, and half (50 percent) consumed tea. Fourteen percent and 10 percent consumed sugar sweetened beverages purchased from the market and made at home, respectively (Table 5.3).

Since cooking oil is used while cooking vegetables in Nepali household, almost all children 69 years ( 95 percent) had consumed foods made with cooking oil. Consumption of vegetable ghee was not common with four percent reporting consuming it. Overall 15 percent of children 6-9 years consumed other fats from animal sources such as butter, animal fat and animal ghee (Table 5.4).

### 5.3 PICA Syndrome among Children 6-9 Years

Consumption of clay, earth or termite mounds among children 6-9 years was very low and only 6 children out of 1138 reported to eat such items during the 7 days prior to the survey (data not shown). Fourteen percent of the children 6-9 years on the other hand had consumed uncooked rice, starch or ice in the past 7 days. The practice of eating such items was 46 percent in the Far-western region; 20 percent and 17 percent in the Mountain and Terai, respectively; and 27 percent among the Terai Janajati caste group. Any PICA syndrome (consumption of either clay, earth, termite mounds, uncooked rice, starch or ice) among children 6-9 years was 15 percent ranging from nine percent in Western region to 47 percent in Far-western region. Around two in ten (21 percent) in Mountain, nine percent in Hill and 18 percent in Terai had PICA syndrome. By caste, any PICA was highest among children in Terai Janajati caste group (27 percent) (Table 5.5)

### 5.4 Dietary Diversity among Adolescent Boys 10-19 Years

Among the adolescent boys 10-19 years, overall, almost half ( 48 percent) achieved the minimum dietary diversity the day before the survey and this varied significantly by age, wealth quintile, and ethnicity. The proportion of adolescent boys 10-19 years meeting the minimum dietary diversity was 37 percent in the Mid-western region and 55 percent in the Western region. It was lower in rural areas compared to urban areas ( 46 percent versus 59 percent). About 70 percent or more of adolescent boys 10-19 years from the highest wealth quintile and the Hill Brahmin and Newar castes consumed the minimum dietary diversity the previous day (Table 5.6).

### 5.5 Types of Foods Consumed by Adolescent Boys 10-19 Years in the Day Preceding the Survey

Table 5.7 shows the types of foods consumed by adolescent boys $10-19$ years in the previous day. All boys had consumed food made from grain followed by foods made from roots and tubers ( 82 percent), other vegetables ( 76 percent), legumes ( 71 percent), dairy products (45 percent), dark-green leafy vegetables ( 42 percent), and other fruits ( 39 percent). About a quarter ( 26 percent) of boys had consumed meat, such as chicken, goat, buffalo, pigs, or ducks; around 15 percent consumed vitamin A rich fruit and eggs. Around six or seven percent of adolescent boys consumed fish, organ meat, or nuts and seeds, respectively. Consumption of snails, larva or other insects was almost negligible in the country where only 6 adolescent boys 10-19 years out of 1025 reported consuming it (data not shown).

Overall, 68 percent of adolescent boys 10-19 years consumed sweet foods such as candy, chocolates, cakes, or biscuits, and slightly more than half ( 55 percent) consumed tea. Two in ten ( 21 percent) and 12 percent had consumed sugar sweetened beverages purchased from the market or made at home, respectively. The consumption of Tibetan tea or coffee was less than one percent (Table 5.8).

Virtually all adolescent boys consumed foods made with cooking oil the previous day of the survey. Consumption of vegetable ghee was not common and less than one percent reported consuming it. Overall, a quarter ( 24 percent) of boys consumed other fats from animal sources, such as butter, animal fat or animal ghee (Table 5.9).

### 5.6 PICA Syndrome among Adolescent Boys 10-19 Years

Among 1025 adolescent boys, one reported consuming clay, earth or termite mounds in the past 7 days (data not shown). Thirteen percent of the adolescent boys consumed uncooked rice, starch, or ice during the 7 days prior to the survey. Any PICA syndrome among adolescent boys was 13 percent and varied by development region, ecological zone and ethnicity. Any PICA syndrome ranged from nine percent in Western region to 34 percent in Far-western region and ranged from eight percent in Hill to 17 percent in Terai. About one quarter of adolescent boys among the Terai Janajati caste group reported PICA syndrome (Table 5.10).

### 5.7 Dietary Diversity among Adolescent Girls 10-19 Years

Among the adolescent girls 10-19 years, approximately four in ten (43 percent) achieved the minimum dietary diversity the day prior to the survey. This varied significantly by development region, urban/rural location, education, wealth quintile, and ethnicity. Girls achieving the minimum dietary was 34 percent in the Mid-western region and 48 percent in the Western region, and it was 42 percent among girls in rural areas and 54 percent in urban areas. The proportion of girls achieving the minimum dietary diversity was about 35 percent among those from the lowest and second lowest wealth quintiles and was 63 percent among adolescent girls from the highest wealth quintile group. Among adolescent girls from the Newar and Hill Brahmin caste groups, 63 and 61 percent, respectively, achieved the minimum dietary diversity; 26 percent of adolescent girls among the Terai Janajati group did so (Table 5.11).

### 5.8 Types of Foods Consumed by Adolescent Girls 10-19 Years in the Preceding Day of the Survey

Table 5.12 shows the types of foods consumed by adolescent girls 10-19 years in the day prior to the survey. Nearly all girls consumed foods made from grains followed by legumes (97 percent), foods made from roots and tubers ( 81 percent), other vegetables ( 75 percent), dark green leafy vegetables ( 46 percent), other fruits ( 40 percent) and dairy products ( 39 percent). Around a quarter ( 24 percent) of girls consumed meat, such as chicken, goat, buffalo, pigs, or ducks; 13 percent consumed vitamin A rich fruit, and 10 percent consumed eggs. About five to eight percent of girls consumed fish, organ meats, nuts and seeds, or vitamin A rich vegetable, respectively. Consumption of snails, larva or other insects was almost negligible in the country where only 9 adolescent girls 10-19 years out of 1865 reported consuming it (data not shown).

Overall, 64 percent of girls consumed sweet foods such as candy, chocolates, cakes, or biscuits the day prior to the survey, and almost half (49 percent) consumed tea. Over one in ten (13 percent) consumed sugar sweetened beverages either purchased from the market or made at home, respectively (Table 5.13).

Almost all adolescent girls 10-19 years (97 percent) consumed foods made with cooking oil. Consumption of vegetable ghee was not common and two percent reported consuming food made with it. Overall 13 percent of girls had consumed other fats from animal sources, such as butter, animal fat or animal ghee (Table 5.14).

### 5.9 PICA Syndrome among Adolescent Girls 10-19 Years

Out of 1865 adolescent girls 10-19 years, 5 reported consuming clay, earth or termite mounds in the 7 days prior to the survey (data not shown), whereas 12 percent reported consuming uncooked rice, starch or ice. Any PICA syndrome among adolescent girls was 12 percent with a range of 41 percent in the Far-western region to seven percent in the Western region. The proportion of adolescent girls reporting PICA syndrome was 21 percent in Mountain, seven percent in Hill and 15 percent in Terai. By caste, 22 percent of adolescent girls from the Terai Janajati reported practicing PICA (Table 5.15).

### 5.10 Dietary Diversity among Women 15-49 Years

Among the reproductive age women 15-49 years, overall, half (49 percent) achieved the minimum dietary diversity the day prior to the survey. This varied significantly by developmental region, ecological region, urban/rural location, age, lactation status, education, wealth quintile, and ethnicity. The proportion of women 15-49 years meeting the minimum dietary diversity was 40 percent in the Mid-western region and 53 percent in the Central region. It was 38 percent among the Mountain, 48 percent among the Terai and 51 percent among the Hill ecological zone. It was lower in rural areas compared to urban areas ( 47 percent versus 60 percent). Among women with no education, 35 percent achieved the minimum dietary diversity indicator and 63 percent did so among those with the highest levels of education (SLC and higher). Further, it was 31 percent among women 15-49 years from the lowest wealth quintile and 71 percent among women in the highest wealth quintile group. Among the women 15-49 years from Hill Brahmin and Newar caste groups, 67 and 62 percent, respectively, met the minimum dietary diversity the day prior to the survey (Table 5.16).

### 5.11 Types of Foods Consumed by Women 15-49 Years in the Preceding Day of the Survey

Table 5.17 shows the types of food consumed by women of reproductive age 15-49 years in the day prior to the survey. Almost all had consumed foods made from grains, followed by foods made from roots and tubers (86 percent), other vegetables (82 percent), and legumes (73 percent). Overall half ( 50 percent) had consumed dark green leafy vegetables and 44 percent consumed dairy product. Over one third (35 percent) had consumed other fruits, a quarter (26 percent) consumed meat, such as chicken, goat, buffalo, pigs, or ducks, and 10 percent consumed eggs. Consumption of snails, larva or other insects was almost negligible in the country and only 4 women out of 2,351 reported consuming any of these foods (data not shown).

Overall, half (52 percent) of women 15-49 years consumed sweet foods such as candy, chocolates, cakes, or biscuits, and approximately six in ten consumed tea on the day prior to the survey. Over one in ten (13 percent) each had consumed sugar sweetened beverages either purchased from the market or made at home, respectively (Table 5.18).

Almost all women 15-49 years (97 percent) consumed foods prepared with cooking oil. Consumption of vegetable ghee was not common as two percent reported consuming it. Overall 14 percent of women 15-49 years had consumed other fats from animal sources, such as butter, animal fat or animal ghee (Table 5.19).

### 5.12 PICA Syndrome among Women 15-49 Years

Consumption of clay, earth or termite mounds was very low among women 15-49 years, where only 7 out of 2,351 reported consuming these products during the 7 days prior to the survey (data not shown). Six percent of women reported consuming uncooked rice, starch or ice. The overall PICA syndrome among women was six percent and ranged from three percent in the

Central and Western regions to 21 percent in the Far-western region. It was 13 percent in Mountain, three percent in Hill and seven percent in Terai ecological zones. PICA syndrome decreases with increasing age of women (12 percent among 15-19 years versus two percent among 40-49 years). PICA syndrome was significantly higher among pregnant women with 12 percent having it compared to five percent among non-pregnant women. By wealth quintile it varied from four percent in the highest quintile to eight percent in the lowest quintile. Among women in the Terai Janajati caste ethnic group, 14 percent reported practicing PICA syndrome (Table 5.20).

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Table 5.1: Minimum Dietary Diversity the Day Preceeding the Survey among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumed Minimum Dietary Diversity ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Regions |  |  |  |  |
| Eastern | 218 | 44.6 | (34.6-55.1) | 0.061 |
| Central | 227 | 39.3 | (31.2-48.0) |  |
| Western | 205 | 44.0 | (35.7-52.7) |  |
| Mid-western | 244 | 35.1 | (27.8-43.1) |  |
| Far-western | 244 | 50.3 | (42.2-58.4) |  |
| Ecological Region |  |  |  |  |
| Mountain | 177 | 36.6 | (27.1-47.4) | 0.511 |
| Hill | 476 | 43.3 | (38.1-48.6) |  |
| Terai | 485 | 41.1 | (34.2-48.3) |  |
| Location |  |  |  |  |
| Urban | 143 | 55.2 | (42.0-67.7) | 0.001 |
| Rural | 995 | 39.9 | (35.5-44.5) |  |
| Age, years |  |  |  |  |
| 6 | 260 | 40.3 | (33.5-47.6) | 0.067 |
| 7 | 269 | 37.6 | (30.7-45.0) |  |
| 8 | 335 | 40.9 | (34.4-47.7) |  |
| 9 | 275 | 48.5 | (40.1-57.0) |  |
| Sex |  |  |  |  |
| Male | 559 | 40.7 | (34.7-46.9) | 0.508 |
| Female | 579 | 42.6 | (37.6-47.8) |  |
| Education |  |  |  | 0.026 |
| No education ${ }^{\text {b }}$ | 29 | (22.2) | (12.8-35.6) |  |
| Primary ${ }^{\text {c }}$ | 1,104 | 42.4 | (38.0-47.0) |  |
| Some secondary ${ }^{\text {d }}$ | 3 | * | * |  |
| Wealth Quintile |  |  |  | <0.001 |
| Lowest | 328 | 31.1 | (25.6-37.2) |  |
| Second | 244 | 35.8 | (28.8-43.5) |  |
| Middle | 200 | 47.8 | (38.3-57.5) |  |
| Fourth | 203 | 41.0 | (29.7-53.3) |  |
| Highest | 163 | 57.1 | (46.1-67.5) |  |
| Ethnicity |  |  |  | <0.001 |
| Hill Brahmin | 110 | 62.4 | (50.5-73.0) |  |
| Hill Chhetri | 267 | 44.0 | (35.7-52.7) |  |
| Terai Brahmin/Chhetri | 30 | (50.5) | (29.3-71.5) |  |
| Other Terai caste | 81 | 31.9 | (21.8-44.1) |  |
| Hill Dalit | 165 | 43.3 | (34.4-52.7) |  |
| Terai Dalit | 56 | 28.0 | (16.0-44.2) |  |
| Newar | 30 | (52.7) | (33.6-71.1) |  |
| Hill Janajati | 273 | 41.0 | (35.6-46.7) |  |
| Terai Janajati | 97 | 40.7 | (29.2-53.5) |  |
| Muslim | 28 | (39.0) | (22.6-58.3) |  |
|  | 1,138 | 41.6 | (37.4-46.1) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Defined as consuming food items from at least five out of ten defined food groups the previous day or night. The 10 food groups are: Grain white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetables; Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits. FANTA, 2016 |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |
| ${ }^{\text {c Includes those who }}$ have completed 0-5 years of school. ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |


| Characteristics | N | Food made from grains | Roots and tubers | Legumes | Nuts and Seed | Dairy products | Meat ${ }^{\text {a }}$ | Liver, kidney, heart or other organ meat | Eggs | Fish | Dark <br> Green <br> Leafy Vegetable | ```Vitamin A rich vegetables and Tubers``` | Other Vegetable | Vitamin A rich Fruits | Other fruits |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 218 | 100.0 | 86.9 | 70.2 | 7.3 | 44.9 | 26.6 | 6.7 | 9.3 | 9.1 | 45.3 | 2.9 | 59.2 | 7.2 | 39.2 |
| Central | 227 | 100.0 | 78.0 | 71.7 | 5.5 | 47.8 | 22.9 | 3.3 | 10.5 | 4.2 | 38.5 | 6.0 | 68.9 | 15.5 | 27.6 |
| Western | 205 | 100.0 | 84.4 | 77.6 | 6.3 | 43.1 | 28.3 | 6.5 | 18.0 | 5.0 | 39.0 | 9.8 | 63.8 | 18.4 | 41.0 |
| Mid-western | 244 | 100.0 | 80.2 | 72.3 | 3.8 | 31.3 | 20.8 | 6.0 | 11.1 | 5.9 | 37.6 | 6.5 | 72.4 | 9.0 | 38.0 |
| Far-western | 244 | 100.0 | 73.1 | 80.8 | 3.1 | 50.4 | 15.6 | 8.1 | 9.4 | 2.5 | 47.1 | 5.6 | 75.3 | 12.5 | 45.9 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 177 | 100.0 | 75.1 | 67.1 | 4.5 | 33.0 | 27.2 | 4.5 | 8.1 | 1.9 | 45.2 | 4.3 | 64.3 | 5.4 | 33.3 |
| Hill | 476 | 100.0 | 69.9 | 67.8 | 3.1 | 42.8 | 28.1 | 5.3 | 10.8 | 2.4 | 47.7 | 5.9 | 66.3 | 14.0 | 40.9 |
| Terai | 485 | 100.0 | 89.8 | 78.8 | 7.5 | 46.9 | 19.4 | 5.7 | 12.6 | 8.1 | 34.6 | 6.5 | 68.5 | 13.5 | 31.9 |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 100.0 | 86.5 | 73.7 | 3.8 | 53.4 | 26.7 | 4.4 | 21.1 | 9.3 | 35.7 | 8.5 | 76.4 | 13.7 | 42.6 |
| Rural | 995 | 100.0 | 79.9 | 73.5 | 5.7 | 43.0 | 23.0 | 5.6 | 10.3 | 4.9 | 41.3 | 5.8 | 66.1 | 13.0 | 34.7 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-7 | 528 | 100.0 | 81.8 | 74.0 | 3.9 | 45.3 | 24.1 | 3.8 | 11.9 | 5.3 | 38.2 | 6.3 | 64.5 | 14.5 | 32.8 |
| 8-9 | 610 | 100.0 | 79.6 | 73.0 | 7.0 | 43.2 | 22.9 | 7.0 | 11.2 | 5.4 | 43.0 | 5.9 | 70.0 | 11.8 | 38.3 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 328 | 100.0 | 68.0 | 65.3 | 2.1 | 30.8 | 20.1 | 3.5 | 4.7 | 4.4 | 42.4 | 3.9 | 66.9 | 7.8 | 35.0 |
| Second | 244 | 100.0 | 80.9 | 74.5 | 5.4 | 43.5 | 22.2 | 7.1 | 9.8 | 3.1 | 47.1 | 3.7 | 63.5 | 9.1 | 28.7 |
| Middle | 200 | 100.0 | 87.5 | 78.1 | 9.9 | 48.5 | 25.3 | 6.8 | 11.7 | 8.2 | 42.8 | 7.6 | 72.4 | 13.4 | 37.0 |
| Fourth | 203 | 100.0 | 86.7 | 78.3 | 4.4 | 46.1 | 23.3 | 5.9 | 15.3 | 6.5 | 28.8 | 6.6 | 67.4 | 14.3 | 32.3 |
| Highest | 163 | 100.0 | 83.2 | 72.8 | 6.7 | 56.9 | 27.8 | 4.2 | 18.4 | 4.9 | 42.8 | 9.6 | 66.7 | 23.5 | 47.1 |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 100.0 | 82.4 | 79.7 | 8.5 | 72.9 | 17.7 | 3.6 | 6.3 | 4.0 | 40.0 | 7.4 | 68.2 | 17.5 | 48.4 |
| Hill Chhetri | 267 | 100.0 | 77.2 | 82.9 | 3.2 | 49.5 | 20.8 | 5.0 | 8.2 | 1.5 | 43.2 | 4.3 | 66.1 | 13.4 | 40.6 |
| Terai Brahmin/Chhetri | 30 | (100.0) | (96.5) | (78.0) | (10.5) | (67.3) | (9.0) | (4.4) | (19.5) | (0.0) | (41.6) | (12.8) | (66.4) | (15.5) | (47.0) |
| Other Terai Caste | 81 | 100.0 | 97.0 | 83.8 | 3.4 | 50.0 | 9.0 | 1.9 | 8.0 | 7.5 | 30.6 | 3.5 | 69.6 | 12.0 | 19.4 |
| Hill Dalit | 165 | 100.0 | 70.1 | 74.7 | 2.6 | 33.6 | 38.1 | 8.8 | 14.1 | 2.0 | 48.9 | 7.6 | 67.6 | 13.3 | 38.4 |
| Terai Dalit | 57 | 100.0 | 94.5 | 74.2 | 12.2 | 37.5 | 16.7 | 3.4 | 9.8 | 11.1 | 39.4 | 5.9 | 64.5 | 8.8 | 21.3 |
| Newar | 30 | (100.0) | (59.3) | (58.9) | (4.3) | (55.4) | 33.1) | (8.7) | (33.5) | (2.1) | (46.9) | (9.7) | (62.7) | (29.7) | (49.6) |
| Hill Janajati | 273 | 100.0 | 67.7 | 57.6 | 5.6 | 30.8 | 35.8 | 6.8 | 11.7 | 3.7 | 46.3 | 6.2 | 68.0 | 12.3 | 39.5 |
| Terai Janajati | 97 | 100.0 | 87.8 | 70.1 | 3.4 | 30.0 | 23.1 | 11.7 | 19.1 | 13.6 | 31.2 | 8.4 | 74.0 | 11.9 | 36.2 |
| Muslim | 28 | (100.0) | (91.2) | (85.4) | (9.9) | (53.8) | (12.6) | (0.0) | (13.7) | (16.5) | (31.1) | (4.6) | (51.0) | (4.9) | (33.5) |
| Total | 1,138 | 100.0 | 80.7 | 73.5 | 5.5 | 44.2 | 23.5 | 5.4 | 11.5 | 5.4 | 40.7 | 6.1 | 67.3 | 13.1 | 35.6 |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data. <br> Response options read to participants. <br> ${ }^{\text {a }}$ Meat (chicken, goat, buffalo, pig or duck) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 5.3: Consumption of Specific Foods and Beverages the Day Preceeding the Survey among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sweet foods ${ }^{\text {a }}$ | Sugar sweetened beverages from market ${ }^{\text {b }}$ | Sugar sweetened beverages made at home ${ }^{\text {c }}$ | Tea | Tibetan <br> Tea | Coffee |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 218 | 67.5 | 12.7 | 15.9 | 55.5 | 2.8 | 0.0 |
| Central | 227 | 81.2 | 16.7 | 7.8 | 41.1 | 0.6 | 0.0 |
| Western | 205 | 83.9 | 15.6 | 13.6 | 70.9 | 1.3 | 0.7 |
| Mid-western | 244 | 64.7 | 9.8 | 7.3 | 40.1 | 1.6 | 0.0 |
| Far-western | 244 | 76.2 | 10.2 | 4.7 | 52.9 | 0.0 | 0.0 |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 177 | 68.9 | 4.6 | 5.3 | 52.9 | 4.2 | 0.0 |
| Hill | 476 | 72.5 | 11.5 | 7.5 | 55.3 | 1.4 | 0.0 |
| Terai | 485 | 79.7 | 17.3 | 12.5 | 45.8 | 0.7 | 0.2 |
| Location |  |  |  |  |  |  |  |
| Urban | 143 | 74.1 | 22.3 | 13.3 | 57.1 | 0.0 | 0.0 |
| Rural | 995 | 76.2 | 13.0 | 9.5 | 49.2 | 1.4 | 0.1 |
| Age, years |  |  |  |  |  |  |  |
| 6-7 | 528 | 75.6 | 12.9 | 11.3 | 51.6 | 0.6 | 0.0 |
| 8-9 | 610 | 76.3 | 15.1 | 8.7 | 48.7 | 1.9 | 0.2 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 328 | 64.1 | 3.9 | 3.7 | 34.3 | 2.0 | 0.0 |
| Second | 244 | 70.4 | 5.0 | 8.2 | 52.0 | 2.1 | 0.0 |
| Middle | 200 | 79.1 | 16.2 | 7.5 | 45.8 | 0.4 | 0.0 |
| Fourth | 203 | 81.8 | 20.5 | 13.3 | 56.5 | 1.4 | 0.6 |
| Highest | 163 | 88.6 | 28.3 | 19.4 | 67.2 | 0.0 | 0.0 |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 83.3 | 15.0 | 14.7 | 74.6 | 0.0 | 0.0 |
| Hill Chhetri | 267 | 84.4 | 16.2 | 7.1 | 65.8 | 1.1 | 0.3 |
| Terai Brahmin/Chhetri | 30 | (67.7) | (16.3) | (16.0) | (45.8) | (0.0) | (0.0) |
| Other Terai Caste | 81 | 83.8 | 17.5 | 8.1 | 38.4 | 1.4 | 0.0 |
| Hill Dalit | 165 | 70.4 | 9.8 | 4.1 | 49.5 | 0.0 | 0.0 |
| Terai Dalit | 57 | 73.3 | 13.4 | 15.7 | 28.2 | 1.1 | 0.0 |
| Newar | 30 | (81.8) | (31.1) | (9.6) | (83.0) | (0.0) | (0.0) |
| Hill Janajati | 273 | 65.6 | 10.4 | 9.9 | 44.3 | 3.1 | 0.0 |
| Terai Janajati | 97 | 76.0 | 10.8 | 13.3 | 40.0 | 0.0 | 1.1 |
| Muslim | 28 | (75.0) | (10.8) | (10.8) | (58.5) | (0.0) | (0.0) |
| Total | 1,138 | 76.0 | 14.0 | 10.0 | 50.1 | 1.3 | 0.1 |

[^17]Table 5.4: Consumption of Fats the Day Preceeding the Survey among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Cooking Oil | Vegetable Ghee | Other Fats (Butter, Animal fat, Animal ghee) |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% |
| Developmental Region |  |  |  |  |
| Eastern | 218 | 92.6 | 3.4 | 14.6 |
| Central | 227 | 96.2 | 4.1 | 9.5 |
| Western | 205 | 96.5 | 2.3 | 26.8 |
| Mid-western | 244 | 91.8 | 7.0 | 11.9 |
| Far-western | 244 | 95.5 | 1.5 | 23.0 |
| Ecological Region |  |  |  |  |
| Mountain | 177 | 96.8 | 1.6 | 20.5 |
| Hill | 476 | 94.4 | 2.9 | 21.6 |
| Terai | 485 | 94.9 | 4.8 | 9.5 |
| Location |  |  |  |  |
| Urban | 143 | 95.4 | 6.6 | 17.5 |
| Rural | 995 | 94.7 | 3.5 | 14.9 |
| Age, years |  |  |  |  |
| 6-7 | 528 | 96.3 | 3.4 | 14.2 |
| 8-9 | 610 | 93.4 | 4.2 | 16.2 |
| Wealth Quintile |  |  |  |  |
| Lowest | 328 | 93.5 | 4.1 | 13.5 |
| Second | 244 | 94.4 | 2.8 | 13.4 |
| Middle | 200 | 95.1 | 7.4 | 15.3 |
| Fourth | 203 | 94.4 | 3.2 | 13.2 |
| Highest | 163 | 97.4 | 1.5 | 22.1 |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 110 | 94.7 | 1.2 | 42.0 |
| Hill Chhetri | 267 | 94.4 | 3.0 | 22.9 |
| Terai Brahmin/Chhetri | 30 | (100.0) | (3.7) | (15.7) |
| Other Terai Caste | 81 | 97.1 | 6.6 | 4.1 |
| Hill Dalit | 165 | 96.4 | 4.0 | 14.9 |
| Terai Dalit | 57 | 94.4 | 6.8 | 5.5 |
| Newar | 30 | (100.0) | - | (29.3) |
| Hill Janajati | 273 | 94.8 | 2.7 | 12.3 |
| Terai Janajati | 97 | 94.5 | 1.8 | 5.0 |
| Muslim | 28 | (72.3) | (10.2) | (13.5) |
| Total | 1,138 | 94.8 | 3.8 | 15.2 |
| Note: N unweighted. All estimates account for weighting and complex sample design. Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. Sample size might vary slightly due to missing data. |  |  |  |  |

Table 5.5: Consumption of Uncooked Rice, Starch or Ice, and Any PICA Syndrome During 7 Days Prior to the Survey among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumption of Uncooked Rice, Starch or Ice |  |  | Any PICA Syndrom ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 218 | 12.4 | (8.3-18.1) |  | 12.9 | (8.8-18.7) |  |
| Central | 227 | 10.4 | (7.4-14.4) |  | 10.4 | (7.4-14.4) |  |
| Western | 205 | 8.2 | (5.2-12.6) | $<0.001$ | 8.8 | (5.5-13.8) | $<0.001$ |
| Mid-western | 244 | 12.1 | (8.2-17.5) |  | 12.1 | (8.2-17.5) |  |
| Far-western | 244 | 46.0 | (37.7-54.5) |  | 46.5 | (38.3-54.9) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 177 | 20.4 | (17.1-24.3) |  | 21.2 | (18.4-24.3) |  |
| Hill | 476 | 9.3 | (7.1-12.1) | $<0.001$ | 9.3 | (7.1-12.1) | $<0.001$ |
| Terai | 485 | 17.4 | (14.3-21.1) |  | 17.8 | (14.6-21.6) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 143 | 18.5 | (11.1-29.2) | 0154 | 18.5 | (11.1-29.2) | 0185 |
| Rural | 995 | 13.8 | (11.7-16.3) | .154 | 14.1 | (11.9-16.7) | . 185 |
| Age, years |  |  |  |  |  |  |  |
| 6-7 | 528 | 13.8 | (11.2-17.0) | 0.615 | 14.2 | (11.5-17.5) | 0.742 |
| 8-9 | 610 | 14.9 | (12.5-17.6) | 0.615 | 15.0 | (12.6-17.7) | . 742 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 328 | 16.2 | (12.3-21.0) |  | 16.4 | (12.5-21.3) |  |
| Second | 244 | 12.6 | (9.1-17.1) |  | 12.6 | (9.1-17.1) |  |
| Middle | 200 | 10.5 | (6.8-15.8) | 0.031 | 10.5 | (6.8-15.8) | 0.027 |
| Fourth | 203 | 19.2 | (13.3-27.7) |  | 20.0 | (13.7-28.3) |  |
| Highest | 163 | 12.0 | (6.3-21.8) |  | 12.6 | (6.7-22.6) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 11.8 | (7.1-19.0) |  | 12.9 | (7.8-20.7) |  |
| Hill Chhetri | 267 | 21.2 | (15.7-28.02) |  | 21.2 | (15.7-28.0) |  |
| Terai Brahmin/Chhetri | 30 | (8.5) | (2.6-24.0) |  | (8.5) | (2.6-24.0) |  |
| Other Terai Caste | 81 | 17.2 | (13.7-21.5) |  | 17.2 | (13.7-21.5) |  |
| Hill Dalit | 165 | 17.2 | (11.8-24.4) | 0 | 17.8 | (12.3-25.0) | <0.001 |
| Terai Dalit | 57 | 10.7 | (4.2-24.8) | . 0 | 10.7 | (4.2-24.8) | <0.001 |
| Newar | 30 | (11.1) | (2.7-35.4) |  | (11.1) | (2.7-35.4) |  |
| Hill Janajati | 273 | 6.9 | (4.9-9.7) |  | 6.9 | (4.9-9.7) |  |
| Terai Janajati | 97 | 26.9 | (16.9-40.1) |  | 26.9 | (16.9-40.1) |  |
| Muslim | 28 | (9.4) | (2.6-28.8) |  | (12.7) | (4.7-30.0) |  |
|  | 1,138 | 14.4 | (12.4-16.6) |  | 14.6 | (12.6-16.9) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Consumption of clay, earth, termite mounds, uncooked rice, starch or ice.

Table 5.6: Minimum Dietary Diversity the Day Preceeding the Survey among Adolescent Boys 1019 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumed Minimum Dietary Diversity ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Regions |  |  |  |  |
| Eastern | 208 | 43.9 | (36.9-51.1) |  |
| Central | 209 | 52.0 | (45.9-58.0) |  |
| Western | 195 | 54.6 | (48.3-60.8) | 0.007 |
| Mid-western | 199 | 36.6 | (30.4-43.3) |  |
| Far-western | 214 | 45.1 | (36.8-53.6) |  |
| Ecological Region |  |  |  |  |
| Mountain | 157 | 39.6 | (30.7-49.4) |  |
| Hill | 435 | 49.2 | (45.6-52.8) | 0.361 |
| Terai | 433 | 48.0 | (42.8-53.3) |  |
| Location |  |  |  |  |
| Urban | 143 | 59.0 | (49.4-68.0) | 0.004 |
| Rural | 882 | 46.1 | (42.3-50.0) | 0.004 |
| Age, years |  |  |  |  |
| 10-11 | 207 | 41.2 | (33.8-49.1) |  |
| 12-13 | 265 | 44.8 | (38.1-51.8) |  |
| 14-15 | 238 | 46.5 | (39.8-53.3) | 0.011 |
| 16-17 | 165 | 56.5 | (48.3-64.4) |  |
| 18-19 | 150 | 54.7 | (46.0-63.1) |  |
| Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 7 | * | * |  |
| Primary ${ }^{\text {c }}$ | 321 | 38.6 | (32.5-45.0) | <0.001 |
| Some secondary ${ }^{\text {d }}$ | 553 | 48.7 | (43.8-53.6) |  |
| SLC and above ${ }^{\text {e }}$ | 144 | 64.6 | (56.4-72.1) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 252 | 25.4 | (21.2-30.1) |  |
| Second | 211 | 42.5 | (35.1-50.4) |  |
| Middle | 209 | 46.8 | (39.3-54.4) | $<0.001$ |
| Fourth | 165 | 45.9 | (37.5-54.6) |  |
| Highest | 188 | 75.2 | (68.8-80.7) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 137 | 69.9 | (62.3-76.6) |  |
| Hill Chhetri | 267 | 53.3 | (46.2-60.3) |  |
| Terai Brahmin/Chhetri | 32 | (60.6) | (26.6-86.8) |  |
| Other Terai caste | 70 | 41.7 | (28.5-56.2) |  |
| Hill Dalit | 121 | 38.8 | (30.2-48.1) | <0.001 |
| Terai Dalit | 38 | (42.3) | (28.1-58.0) | <0.001 |
| Newar | 37 | (69.8) | (54.8-81.5) |  |
| Hill Janajati | 211 | 39.4 | (33.9-45.3) |  |
| Terai Janajati | 90 | 39.0 | (28.6-50.6) |  |
| Muslim | 22 | * | * |  |
|  | 1,025 | 47.9 | (44.8-51.1) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Defined as consuming food items from at least five out of ten defined food groups the previous day or night. The 10 food groups are: Grains, white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetables; Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits. FANTA, 2016 <br> ${ }^{\mathrm{b}}$ Includes those who have never attended school. <br> ${ }^{\text {c I Includes those who have completed 0-5 years of school. }}$ <br> ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
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|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |


| Characteristics | N | Food made from grains \% | Roots and <br> tubers <br> $\%$ | Legumes <br> $\%$ | Nuts and Seed | Dairy <br> products <br> $\%$ | Meat ${ }^{\text {a }}$$\%$ | Liver, kidney, heart or otherorgan meat <br> $\%$ | $\begin{gathered} \text { Eggs } \\ \hline \% \\ \hline \end{gathered}$ | $\begin{gathered} \text { Fish } \\ \hline \% \\ \hline \end{gathered}$ | Dark GreenLeafyVegetable | Vitamin A <br> rich <br> vegetables <br> $\%$ | Other <br> Vegetable <br> $\%$ | VitaminA richfruits | Other fruits <br> $\%$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 208 | 99.7 | 86.6 | 64.0 | 4.9 | 44.0 | 27.2 | 10.1 | 6.5 | 9.1 | 45.0 | 5.1 | 66.5 | 11.6 | 36.9 |
| Central | 209 | 100.0 | 79.2 | 71.0 | 13.1 | 47.6 | 27.6 | 5.6 | 18.9 | 2.6 | 42.4 | 16.2 | 80.3 | 16.8 | 36.7 |
| Western | 195 | 99.6 | 89.0 | 79.3 | 5.8 | 44.7 | 26.2 | 4.9 | 17.2 | 6.4 | 42.5 | 9.9 | 82.2 | 18.6 | 43.6 |
| Mid-western | 199 | 100.0 | 78.2 | 69.7 | 2.5 | 34.2 | 24.1 | 8.4 | 11.2 | 4.8 | 36.4 | 7.3 | 71.2 | 12.0 | 36.2 |
| Far-western | 214 | 100.0 | 71.8 | 74.8 | 4.3 | 47.9 | 19.2 | 7.1 | 6.8 | 6.8 | 40.0 | 10.8 | 73.7 | 10.4 | 46.3 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 157 | 100.0 | 63.5 | 70.4 | 3.9 | 44.2 | 24.3 | 6.1 | 6.1 | 5.8 | 44.4 | 6.8 | 73.2 | 7.3 | 38.1 |
| Hill | 435 | 99.9 | 75.9 | 67.2 | 7.9 | 44.0 | 27.3 | 6.2 | 15.6 | 3.5 | 52.8 | 8.7 | 74.4 | 16.7 | 42.7 |
| Terai | 433 | 99.8 | 89.2 | 74.8 | 7.5 | 45.0 | 24.9 | 7.7 | 12.6 | 7.3 | 32.8 | 12.9 | 77.0 | 13.9 | 36.3 |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 100.0 | 87.9 | 80.9 | 11.2 | 41.5 | 30.9 | 3.2 | 16.8 | 4.7 | 41.6 | 16.5 | 77.3 | 13.9 | 43.9 |
| Rural | 882 | 99.8 | 80.9 | 69.8 | 6.8 | 45.0 | 25.1 | 7.6 | 12.9 | 5.7 | 42.0 | 9.8 | 75.4 | 14.8 | 38.4 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 207 | 99.3 | 82.3 | 64.6 | 6.6 | 44.5 | 20.8 | 5.1 | 10.9 | 2.9 | 39.3 | 8.7 | 72.2 | 11.7 | 32.2 |
| 12-13 | 265 | 100.0 | 80.0 | 72.0 | 5.8 | 38.4 | 21.8 | 8.8 | 10.6 | 5.9 | 43.5 | 10.5 | 76.5 | 17.0 | 43.2 |
| 14-15 | 238 | 100.0 | 84.9 | 69.3 | 4.6 | 50.9 | 23.1 | 4.8 | 13.7 | 5.0 | 38.9 | 9.7 | 74.0 | 16.5 | 35.5 |
| 16-17 | 165 | 100.0 | 78.4 | 76.9 | 9.9 | 41.1 | 32.1 | 7.9 | 12.0 | 8.3 | 45.2 | 11.1 | 85.3 | 13.3 | 46.4 |
| 18-19 | 150 | 100.0 | 83.3 | 76.3 | 12.2 | 48.0 | 36.3 | 8.9 | 21.7 | 6.7 | 44.1 | 14.5 | 71.7 | 13.7 | 39.8 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 252 | 100.0 | 64.9 | 53.6 | 1.9 | 35.9 | 21.6 | 6.9 | 3.1 | 4.9 | 37.9 | 7.2 | 67.8 | 7.3 | 34.8 |
| Second | 211 | 100.0 | 79.6 | 67.8 | 5.5 | 44.6 | 23.7 | 7.7 | 16.5 | 5.9 | 43.1 | 3.6 | 73.1 | 10.7 | 31.0 |
| Middle | 209 | 99.7 | 83.7 | 75.8 | 7.2 | 39.3 | 21.3 | 7.0 | 7.7 | 9.2 | 43.6 | 6.8 | 74.8 | 17.7 | 34.0 |
| Fourth | 165 | 99.5 | 87.2 | 72.7 | 5.1 | 43.5 | 31.5 | 10.4 | 14.4 | 4.9 | 30.8 | 10.9 | 76.7 | 14.9 | 37.2 |
| Highest | 188 | 100.0 | 92.5 | 84.2 | 16.1 | 58.0 | 31.7 | 3.6 | 24.5 | 2.8 | 51.8 | 24.2 | 84.9 | 21.2 | 57.3 |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 100.0 | 83.4 | 81.8 | 9.2 | 67.1 | 23.7 | 5.9 | 17.4 | 1.2 | 44.3 | 15.6 | 77.9 | 27.4 | 57.2 |
| Hill Chhetri | 267 | 100.0 | 83.0 | 72.7 | 8.3 | 57.2 | 22.0 | 6.2 | 13.4 | 2.4 | 48.5 | 8.0 | 75.6 | 16.4 | 44.6 |
| Terai Brahmin/Chhetri | 32 | (100.0) | (98.3) | (83.8) | (17.0) | (50.3) | (19.5) | (0.0) | (11.7) | (1.7) | (26.6) | (18.6) | (76.7) | (18.8) | (54.7) |
| Other Terai Caste | 70 | 100.0 | 89.7 | 80.4 | 3.2 | 44.1 | 16.8 | 5.1 | 4.2 | 6.4 | 34.2 | 14.8 | 81.5 | 11.5 | 29.4 |
| Hill Dalit | 121 | 100.0 | 73.5 | 67.2 | 5.1 | 34.0 | 30.6 | 11.0 | 12.4 | 3.9 | 47.6 | 7.3 | 77.9 | 5.6 | 33.1 |
| Terai Dalit | 38 | (98.8) | (85.3) | (80.5) | (4.6) | (46.8) | (16.5) | (8.3) | (8.3) | (11.5) | (39.0) | (12.5) | (51.7) | (9.1) | (24.7) |
| Newar | 37 | (98.6) | (77.8) | (61.4) | (23.6) | (48.5) | (36.6) | (0.0) | (41.0) | (1.2) | (64.6) | (19.0) | (80.6) | (23.5) | (40.9) |
| Hill Janajati | 211 | 100.0 | 70.3 | 62.2 | 3.7 | 32.8 | 33.8 | 9.3 | 12.7 | 6.5 | 45.3 | 4.9 | 75.6 | 8.7 | 36.3 |
| Terai Janajati | 90 | 100.0 | 89.1 | 59.6 | 10.2 | 25.6 | 29.3 | 8.7 | 12.7 | 14.2 | 32.2 | 11.3 | 84.8 | 21.0 | 37.9 |
| Muslim | 22 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Total | 1,025 | 99.9 | 81.9 | 71.3 | 7.4 | 44.5 | 25.9 | 7.0 | 13.4 | 5.6 | 42.2 | 10.7 | 75.7 | 14.6 | 39.1 |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Sample size might vary slightly due to missing data. Response options read to participants. ${ }^{\text {a }}$ Meat (chicken, goat, buffalo, pig or duck) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 5.8: Consumption of Specific Foods and Beverages the Day Preceeding the Survey among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sweet foods ${ }^{\text {a }}$ | Sugar sweetened beverages from market ${ }^{\text {b }}$ | Sugar sweetened beverages made at home ${ }^{\text {c }}$ | Tea | Tibetan Tea ${ }^{\text {d }}$ | Coffee |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 208 | 58.6 | 16.7 | 14.3 | 47.7 | 2.5 | 0.2 |
| Central | 209 | 70.0 | 28.3 | 11.0 | 50.4 | 1.2 | 0.0 |
| Western | 195 | 81.8 | 20.9 | 17.7 | 75.6 | 0.0 | 2.4 |
| Mid-western | 199 | 56.7 | 18.4 | 6.8 | 40.6 | 0.6 | 0.0 |
| Far-western | 214 | 69.8 | 12.7 | 6.4 | 60.4 | 0.0 | 0.6 |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 157 | 71.6 | 14.0 | 6.0 | 68.1 | 5.4 | 0.7 |
| Hill | 435 | 69.3 | 16.7 | 10.0 | 64.7 | 1.6 | 0.7 |
| Terai | 433 | 66.5 | 25.8 | 14.4 | 44.6 | 0.0 | 0.5 |
| Location |  |  |  |  |  |  |  |
| Urban | 143 | 79.1 | 30.8 | 12.2 | 62.7 | 1.5 | 0.0 |
| Rural | 882 | 66.2 | 19.6 | 12.0 | 53.4 | 1.0 | 0.7 |
| Age, years |  |  |  |  |  |  |  |
| 10-11 | 207 | 66.4 | 14.8 | 10.8 | 50.3 | 0.0 | 0.0 |
| 12-13 | 265 | 70.5 | 12.6 | 14.5 | 48.4 | 1.1 | 1.1 |
| 14-15 | 238 | 69.3 | 21.7 | 10.1 | 57.6 | 1.3 | 1.0 |
| 16-17 | 165 | 66.8 | 31.1 | 11.0 | 66.4 | 1.8 | 0.0 |
| 18-19 | 150 | 65.7 | 31.8 | 13.6 | 54.2 | 1.3 | 0.6 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 252 | 59.5 | 7.3 | 3.8 | 45.7 | 1.7 | 0.2 |
| Second | 211 | 61.5 | 15.8 | 8.2 | 53.2 | 1.0 | 0.0 |
| Middle | 209 | 62.3 | 21.9 | 9.0 | 49.0 | 0.6 | 1.6 |
| Fourth | 165 | 71.9 | 24.4 | 18.7 | 55.2 | 0.0 | 0.5 |
| Highest | 188 | 84.3 | 34.8 | 20.3 | 69.1 | 1.8 | 0.5 |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 81.3 | 21.8 | 15.1 | 82.8 | 1.8 | 0.0 |
| Hill Chhetri | 267 | 68.8 | 16.7 | 8.3 | 69.7 | 0.4 | 1.3 |
| Terai Brahmin/Chhetri | 32 | (64.0) | (30.0) | (19.5) | (42.9) | (0.0) | (0.0) |
| Other Terai Caste | 70 | 71.6 | 34.0 | 11.5 | 46.6 | 0.0 | 0.6 |
| Hill Dalit | 121 | 61.7 | 19.7 | 7.5 | 59.7 | 2.3 | 0.1 |
| Terai Dalit | 38 | (59.6) | (19.3) | (9.5) | (35.5) | (0.0) | (1.5) |
| Newar | 37 | (86.2) | (38.9) | (8.5) | (72.1) | (0.0) | (2.3) |
| Hill Janajati | 211 | 65.1 | 16.7 | 12.3 | 48.9 | 2.8 | 0.2 |
| Terai Janajati | 90 | 57.5 | 12.9 | 18.2 | 16.2 | 0.0 | 0.0 |
| Muslim | 22 | * | * | * | * | * | * |
|  | 1,025 | 68.0 | 21.2 | 12.0 | 54.6 | 0.0 | 0.6 |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice-cream |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Such as soft drinks, juice drinks, and other drinks with added sugar purchased from market |  |  |  |  |  |  |  |
| ${ }^{\text {'S }}$ Such as soft drinks, juice drinks, and other drinks with added sugar made at home ${ }^{\mathrm{d}}$ Tea mixed ghee and salt |  |  |  |  |  |  |  |

Table 5.9: Consumption of Fats the day Preceeding the Survey among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Cooking Oil | Vegetable Ghee | Other Fats (Butter, Animal Fat, Animal Ghee) |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% |
| Developmental Region |  |  |  |  |
| Eastern | 208 | 92.2 | 2.9 | 14.9 |
| Central | 209 | 97.7 | 3.2 | 10.7 |
| Western | 195 | 96.5 | 3.6 | 24.1 |
| Mid-western | 199 | 95.7 | 2.6 | 12.9 |
| Far-western | 214 | 99.3 | 0.7 | 24.3 |
| Ecological Region |  |  |  |  |
| Mountain | 157 | 98.9 | 1.5 | 21.2 |
| Hill | 435 | 97.9 | 2.1 | 18.9 |
| Terai | 433 | 94.3 | 3.6 | 13.2 |
| Location |  |  |  |  |
| Urban | 143 | 96.8 | 3.0 | 14.4 |
| Rural | 882 | 96.0 | 2.8 | 16.4 |
| Age, years |  |  |  |  |
| 10-11 | 207 | 91.8 | 1.6 | 19.0 |
| 12-13 | 265 | 96.1 | 4.1 | 15.4 |
| 14-15 | 238 | 97.0 | 1.9 | 18.7 |
| 16-17 | 165 | 97.1 | 2.9 | 16.5 |
| 18-19 | 150 | 99.5 | 3.8 | 9.6 |
| Wealth Quintile |  |  |  |  |
| Lowest | 252 | 99.0 | 1.0 | 15.7 |
| Second | 211 | 95.6 | 4.1 | 17.7 |
| Middle | 209 | 97.6 | 1.8 | 12.3 |
| Fourth | 165 | 89.3 | 4.0 | 11.1 |
| Highest | 188 | 98.3 | 3.4 | 23.0 |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 137 | 98.2 | 2.8 | 29.8 |
| Hill Chhetri | 267 | 99.3 | 1.2 | 21.6 |
| Terai Brahmin/Chhetri | 32 | (96.0) | (7.0) | (20.2) |
| Other Terai Caste | 70 | 93.0 | 3.0 | 12.6 |
| Hill Dalit | 121 | 99.1 | 0.9 | 15.1 |
| Terai Dalit | 38 | (94.3) | (2.1) | (8.1) |
| Newar | 37 | (98.6) | (0.0) | (19.7) |
| Hill Janajati | 211 | 97.0 | 2.4 | 11.4 |
| Terai Janajati | 90 | 93.4 | 7.8 | 8.9 |
| Muslim | 22 | * | * | * |
|  | 1,025 | 99.3 | 0.7 | 24.3 |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.

Table 5.10: Consumption of Uncooked Rice, Starch or Ice, and any PICA Syndrome during 7 Days Prior to the Survey among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumption of Uncooked Rice, Starch or Ice |  |  | Any PICA Syndrome ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 208 | 10.3 | (8.1-13.0) |  | 10.3 | (8.1-13.0) |  |
| Central | 209 | 10.0 | (6.2-15.8) |  | 10.0 | (6.2-15.8) |  |
| Western | 195 | 8.3 | (5.2-12.9) | <0.001 | 9.2 | (5.8-14.3) | <0.001 |
| Mid-western | 199 | 12.0 | (8.0-17.5) |  | 12.0 | (8.0-17.5) |  |
| Far-western | 214 | 34.2 | (26.4-42.9) |  | 34.2 | (26.4-42.9) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 157 | 12.9 | (7.8-20.6) |  | 12.9 | (7.8-20.6) |  |
| Hill | 435 | 7.4 | (6.0-9.1) | <0.001 | 7.8 | (6.3-9.7) | <0.001 |
| Terai | 433 | 16.9 | (13.4-21.2) |  | 16.9 | (13.4-21.2) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 143 | 11.4 | (5.7-21.5) | 0.588 | 11.4 | (5.7-21.5) | 0.561 |
| Rural | 882 | 12.9 | (10.6-15.5) | 0.588 | 13.1 | (10.8-15.7) | 0.561 |
| Age, years |  |  |  |  |  |  |  |
| 10-11 | 207 | 11.6 | (7.8-16.9) |  | 12.5 | (8.6-17.9) |  |
| 12-13 | 265 | 14.1 | (10.5-18.7) |  | 14.1 | (10.5-18.7) |  |
| 14-15 | 238 | 12.3 | (7.9-18.6) | 0.952 | 12.3 | (7.9-18.6) | 0.977 |
| 16-17 | 165 | 12.2 | (7.4-19.4) |  | 12.2 | (7.4-19.4) |  |
| 18-19 | 150 | 12.9 | (7.7-21.0) |  | 12.9 | (7.7-21.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 252 | 13.9 | (10.9-17.7) |  | 13.9 | (10.9-17.7) |  |
| Second | 211 | 11.7 | (7.2-18.4) |  | 11.7 | (7.2-18.4) |  |
| Middle | 209 | 13.0 | (9.0-18.4) | 0.786 | 13.0 | (9.0-18.4) | 0.686 |
| Fourth | 165 | 10.4 | (6.5-16.1) |  | 10.4 | (6.5-16.1) |  |
| Highest | 188 | 14.0 | (9.4-20.3) |  | 14.8 | (10.3-21.0) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 16.7 | (11.4-23.9) |  | 18.3 | (13.2-24.7) |  |
| Hill Chhetri | 267 | 15.6 | (11.5-20.9) |  | 15.6 | (11.5-20.9) |  |
| Terai Brahmin/Chhetri | 32 | (8.0) | (2.4-23.4) |  | (8.0) | (2.4-23.4) |  |
| Other Terai Caste | 70 | 10.1 | (3.3-27.1) |  | 10.1 | (3.3-27.1) |  |
| Hill Dalit | 121 | 14.6 | (8.6-23.5) | <0.001 | 14.6 | (8.6-23.5) | <0.001 |
| Terai Dalit | 38 | (4.3) | (0.9-18.0) | <0.001 | (4.3) | (0.9-18.0) | <0.001 |
| Newar | 37 | (18.3) | (11.9-27.1) |  | (18.3) | (11.9-27.1) |  |
| Hill Janajati | 211 | 5.6 | (3.4-9.1) |  | 5.6 | (3.4-9.1) |  |
| Terai Janajati | 90 | 25.5 | (16.4-37.3) |  | 25.5 | (16.4-37.3) |  |
| Muslim | 22 | * | * |  | * | * |  |
| Total | 1,025 | 12.7 | (10.6-15.0) |  | 12.8 | (10.8-15.2) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data |  |  |  |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Table 5.11: Minimum Dietary Diversity the day Preceeding the Survey among Adolescent Girls 1019 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumed Minimum Dietary diversity ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Regions |  |  |  |  |
| Eastern | 357 | 38.3 | (29.9-47.5) |  |
| Central | 357 | 45.9 | (41.8-50.1) |  |
| Western | 353 | 48.0 | (41.7-54.4) | 0.001 |
| Mid-western | 383 | 33.8 | (28.2-39.9) |  |
| Far-western | 415 | 45.8 | (36.8-55.1) |  |
| Ecological Region |  |  |  |  |
| Mountain | 291 | 41.5 | (28.7-55.7) |  |
| Hill | 782 | 45.6 | (42.0-49.2) | 0.130 |
| Terai | 792 | 40.8 | (36.0-45.8) |  |
| Location |  |  |  |  |
| Urban | 216 | 54.0 | (45.7-61.2) | 0.001 |
| Rural | 1649 | 41.7 | (38.2-45.2) | . 001 |
| Age, years |  |  |  |  |
| 10-11 | 343 | 41.7 | (36.0-47.5) |  |
| 12-13 | 445 | 39.8 | (35.0-44.7) |  |
| 14-15 | 404 | 42.6 | (37.1-48.3) | 0.179 |
| 16-17 | 329 | 48.5 | (41.8-55.3) |  |
| 18-19 | 344 | 43.8 | (37.8-50.0) |  |
| Lactating Status <br> (among those who had given birth in the last 5 years) |  |  |  |  |
|  |  |  |  |  |  |
| Yes | 82 | 36.6 | (24.9-50.2) |  |
| No | 7 | * | * |  |
| Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 54 | 19.7 | (11.5-31.6) |  |
| Primary ${ }^{\text {c }}$ | 541 | 41.6 | (36.1-47.3) | <0.001 |
| Some secondary ${ }^{\text {d }}$ | 1004 | 42.7 | (39.3-46.2) | <0.001 |
| SLC and above ${ }^{\text {e }}$ | 265 | 54.1 | (46.1-61.9) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 494 | 35.7 | (31.8-39.7) |  |
| Second | 429 | 34.9 | (29.8-40.5) |  |
| Middle | 338 | 40.0 | (34.8-45.3) | $<0.001$ |
| Fourth | 330 | 47.0 | (39.6-54.5) |  |
| Highest | 274 | 63.0 | (56.7-69.0) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 220 | 60.5 | (49.5-70.5) |  |
| Hill Chhetri | 446 | 49.9 | (44.2-55.6) |  |
| Terai Brahmin/Chhetri | 43 | (40.0) | (15.6-70.8) |  |
| Other Terai caste | 128 | 36.7 | (31.9-41.9) |  |
| Hill Dalit | 234 | 37.7 | (30.7-45.3) | <0.001 |
| Terai Dalit | 92 | 32.8 | (20.8-47.4) | <0.001 |
| Newar | 58 | 62.6 | (47.5-75.6) |  |
| Hill Janajati | 419 | 40.7 | (36.8-44.7) |  |
| Terai Janajati | 188 | 26.0 | (18.1-35.8) |  |
| Muslim | 37 | (49.7) | (32.1-67.3) |  |
|  | 1,865 | 42.9 | (39.9-46.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |
| Sample size might vary slightly due to missing dat |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |
| ${ }^{\text {a }}$ Defined as consuming food items from at least five out of ten defined food groups the previous day or night. The 10 food groups are: Grains, white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetable Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits. FANTA, 2016 |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |
| ${ }^{\text {c Includes those who have completed } 0-5 \text { years of school. }}$ |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and mo | aving |  |  |  |


| Characteristics | N | Food made <br> from <br> grains <br> $\%$ | Roots and <br> tubers <br> $\%$ | Legumes <br> $\%$ | Nuts and <br> Seed <br> $\%$ |  | Meat ${ }^{\text {a }}$$\%$ | Liver, kidney, heart or other | $\begin{gathered} \text { Eggs } \\ \hline \% \end{gathered}$ | $\begin{gathered} \text { Fish } \\ \hline \% \\ \hline \end{gathered}$ | Dark green <br> leafy <br> vegetables <br> $\%$ | Vitamin A <br> rich <br> vegetables <br> $\%$ | Other <br> vegetables <br> $\%$ | Vitamin A rich fruits \% | Other fruits <br> \% |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 357 | 100.0 | 83.8 | 61.9 | 6.0 | 40.2 | 24.1 | 5.9 | 8.9 | 6.0 | 57.5 | 4.9 | 68.2 | 8.1 | 32.1 |
| Central | 357 | 100.0 | 79.5 | 68.6 | 7.8 | 41.6 | 26.2 | 4.8 | 10.3 | 7.5 | 44.1 | 10.9 | 78.8 | 14.2 | 36.8 |
| Western | 353 | 98.8 | 87.2 | 77.5 | 10.0 | 36.1 | 24.3 | 4.5 | 13.6 | 6.2 | 37.5 | 10.8 | 75.5 | 18.4 | 47.6 |
| Mid-western | 383 | 100.0 | 78.7 | 65.7 | 4.0 | 30.3 | 23.4 | 6.1 | 9.5 | 3.1 | 43.6 | 4.0 | 75.7 | 8.4 | 41.9 |
| Far-western | 415 | 100.0 | 72.4 | 77.5 | 4.4 | 46.6 | 15.4 | 5.2 | 5.4 | 4.8 | 46.0 | 7.9 | 77.2 | 12.2 | 44.9 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 291 | 100.0 | 71.6 | 65.8 | 6.7 | 39.6 | 19.3 | 4.2 | 8.9 | 2.5 | 54.8 | 4.0 | 76.7 | 5.0 | 49.0 |
| Hill | 782 | 99.9 | 75.5 | 68.2 | 7.3 | 39.3 | 26.9 | 6.9 | 9.3 | 4.7 | 53.0 | 7.8 | 73.9 | 14.1 | 48.6 |
| Terai | 792 | 99.6 | 87.5 | 71.2 | 6.7 | 39.0 | 21.5 | 3.9 | 10.8 | 7.7 | 38.3 | 9.2 | 76.0 | 12.5 | 30.0 |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 216 | 99.6 | 89.8 | 81.3 | 12.6 | 46.4 | 23.9 | 3.5 | 11.9 | 7.2 | 38.0 | 13.1 | 83.0 | 10.8 | 41.6 |
| Rural | 1649 | 99.8 | 80.1 | 68.2 | 6.3 | 38.4 | 23.7 | 5.4 | 9.8 | 5.8 | 46.8 | 7.7 | 74.3 | 12.9 | 39.3 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 343 | 100.0 | 77.0 | 67.7 | 5.3 | 36.1 | 23.1 | 5.6 | 9.6 | 5.8 | 44.4 | 6.9 | 75.3 | 14.8 | 40.9 |
| 12-13 | 444 | 99.7 | 79.3 | 69.4 | 6.0 | 37.8 | 21.2 | 4.6 | 11.0 | 8.0 | 41.8 | 9.5 | 71.8 | 11.6 | 36.8 |
| 14-15 | 404 | 100.0 | 83.3 | 70.3 | 6.1 | 38.3 | 25.2 | 5.9 | 9.8 | 4.8 | 50.3 | 5.7 | 75.8 | 13.1 | 40.6 |
| 16-17 | 330 | 100.0 | 81.5 | 67.4 | 9.4 | 41.7 | 24.9 | 5.2 | 10.0 | 5.6 | 49.6 | 9.8 | 75.7 | 15.2 | 42.6 |
| 18-19 | 344 | 99.1 | 84.4 | 72.2 | 8.6 | 42.9 | 24.7 | 4.9 | 9.3 | 5.3 | 44.1 | 9.5 | 78.1 | 9.0 | 37.6 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 494 | 100.0 | 65.8 | 59.2 | 2.3 | 31.4 | 26.0 | 7.2 | 5.7 | 3.6 | 52.3 | 3.0 | 66.4 | 10.3 | 43.7 |
| Second | 429 | 100.0 | 80.5 | 66.2 | 5.8 | 33.3 | 20.7 | 4.6 | 7.6 | 4.5 | 49.1 | 3.5 | 73.9 | 14.3 | 35.8 |
| Middle | 338 | 99.2 | 87.0 | 68.9 | 6.8 | 42.2 | 25.2 | 6.5 | 10.8 | 7.8 | 36.6 | 7.0 | 76.5 | 12.0 | 29.8 |
| Fourth | 330 | 99.8 | 89.8 | 76.5 | 8.0 | 36.7 | 21.0 | 4.0 | 9.2 | 9.3 | 43.4 | 12.5 | 78.8 | 11.0 | 39.1 |
| Highest | 274 | 99.7 | 86.0 | 81.0 | 13.9 | 57.4 | 26.1 | 3.1 | 19.2 | 5.2 | 47.2 | 18.5 | 83.1 | 16.3 | 51.2 |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 220 | 99.6 | 85.5 | 84.3 | 14.3 | 71.2 | 12.5 | 5.1 | 10.8 | 1.2 | 45.6 | 15.4 | 85.2 | 19.1 | 55.2 |
| Hill Chhetri | 446 | 100.0 | 83.4 | 78.4 | 6.8 | 49.3 | 16.7 | 3.6 | 12.9 | 3.4 | 50.1 | 9.2 | 76.0 | 10.9 | 51.6 |
| Terai Brahmin/Chhetri | 43 | (100.0) | (93.7) | (70.7) | (17.7) | (51.2) | (1.2) | (1.2) | (11.9) | (1.2) | (49.9) | (12.9) | (60.3) | (11.3) | (41.1) |
| Other Terai Caste | 128 | 99.7 | 91.5 | 80.9 | 4.6 | 43.4 | 7.3 | 1.6 | 4.3 | 10.2 | 32.6 | 9.0 | 74.3 | 11.3 | 24.9 |
| Hill Dalit | 234 | 100.0 | 65.6 | 67.8 | 4.9 | 25.1 | 34.1 | 8.7 | 7.8 | 3.5 | 49.9 | 7.5 | 76.6 | 12.2 | 36.7 |
| Terai Dalit | 94 | 98.0 | 90.7 | 66.7 | 4.6 | 34.0 | 12.7 | 4.5 | 9.0 | 7.8 | 41.9 | 0.3 | 73.0 | 9.9 | 22.9 |
| Newar | 58 | 100.0 | 73.9 | 61.5 | 13.5 | 40.5 | 50.0 | 0.6 | 22.8 | 5.1 | 65.5 | 15.5 | 76.4 | 19.7 | 33.7 |
| Hill Janajati | 419 | 100.0 | 71.8 | 54.7 | 5.5 | 22.6 | 40.4 | 9.0 | 11.0 | 6.8 | 50.0 | 4.5 | 75.0 | 13.6 | 43.0 |
| Terai Janajati | 186 | 100.0 | 83.6 | 61.5 | 3.8 | 28.7 | 27.3 | 4.1 | 5.7 | 12.0 | 31.8 | 7.0 | 69.9 | 9.8 | 24.2 |
| Muslim | 37 | (100.0) | (95.9) | (73.7) | (3.0) | (40.2) | (20.9) | (4.3) | (9.3) | (7.9) | (60.2) | (14.1) | (61.6) | (3.5) | (36.0) |
| Total | 1,865 | 99.8 | 81.1 | 96.5 | 6.9 | 39.2 | 23.7 | 5.2 | 10.0 | 6.0 | 45.9 | 8.2 | 75.1 | 12.6 | 39.5 |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. Sample size might vary slightly due to missing data. Response options read to participants. ${ }^{\text {a Meat (chicken, goat, buffalo, pig or duck) }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 5.13: Consumption of Specific Foods and Beverages the Day Preceeding the Survey among Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sweet foods ${ }^{\text {a }}$ | Sugar sweetened beverages from market ${ }^{\text {b }}$ | Sugar sweetened beverages made at home ${ }^{c}$ | Tea | $\begin{gathered} \text { Tibetan } \\ \text { Tea }^{\mathbf{d}} \end{gathered}$ | Coffee |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 357 | 56.0 | 8.5 | 14.2 | 46.8 | 3.6 | 0.2 |
| Central | 357 | 67.1 | 16.4 | 13.4 | 42.2 | 0.4 | 1.6 |
| Western | 353 | 74.9 | 16.6 | 20.8 | 69.8 | 0.4 | 0.7 |
| Mid-western | 383 | 53.9 | 8.5 | 5.8 | 38.3 | 1.2 | 0.1 |
| Far-western | 415 | 65.0 | 8.8 | 6.2 | 51.2 | 0.0 | 0.1 |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 291 | 71.2 | 10.3 | 9.6 | 64.7 | 4.7 | 0.3 |
| Hill | 782 | 65.4 | 11.7 | 11.6 | 54.2 | 1.9 | 1.0 |
| Terai | 792 | 61.8 | 14.0 | 15.2 | 42.5 | 0.1 | 0.6 |
| Location |  |  |  |  |  |  |  |
| Urban | 216 | 67.9 | 23.1 | 14.2 | 56.7 | 0.0 | 3.6 |
| Rural | 1649 | 63.7 | 11.6 | 13.1 | 48.4 | 1.3 | 0.4 |
| Age, years |  |  |  |  |  |  |  |
| 10-11 | 343 | 70.3 | 10.3 | 11.1 | 44.3 | 1.5 | 0.2 |
| 12-13 | 444 | 70.1 | 13.8 | 13.0 | 51.5 | 2.5 | 0.0 |
| 14-15 | 404 | 63.8 | 12.4 | 12.9 | 45.0 | 0.6 | 1.1 |
| 16-17 | 330 | 58.6 | 13.0 | 13.9 | 53.9 | 0.3 | 1.3 |
| 18-19 | 344 | 55.5 | 13.8 | 15.3 | 52.3 | 0.8 | 1.3 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 494 | 52.6 | 5.2 | 4.4 | 34.2 | 2.4 | 0.3 |
| Second | 429 | 62.1 | 10.4 | 11.6 | 51.1 | 2.2 | 0.1 |
| Middle | 338 | 61.0 | 15.3 | 12.6 | 48.9 | 0.8 | 0.2 |
| Fourth | 330 | 68.6 | 14.1 | 16.0 | 50.0 | 0.0 | 0.7 |
| Highest | 274 | 81.5 | 21.7 | 25.1 | 67.6 | 0.0 | 2.9 |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 220 | 83.1 | 15.6 | 20.9 | 75.2 | 0.2 | 0.8 |
| Hill Chhetri | 446 | 76.0 | 13.3 | 12.4 | 67.8 | 0.4 | 0.1 |
| Terai Brahmin/Chhetri | 43 | (50.7) | (9.4) | (19.2) | (54.7) | (0.0) | (0.0) |
| Other Terai Caste | 128 | 59.6 | 12.0 | 8.9 | 32.7 | 0.0 | 0.8 |
| Hill Dalit | 234 | 61.6 | 9.8 | 8.1 | 43.9 | 0.2 | 0.0 |
| Terai Dalit | 94 | 54.3 | 9.9 | 15.1 | 37.3 | 0.0 | 0.0 |
| Newar | 58 | 75.5 | 23.1 | 18.6 | 78.1 | 0.0 | 9.1 |
| Hill Janajati | 419 | 57.1 | 11.4 | 12.8 | 40.5 | 4.7 | 0.5 |
| Terai Janajati | 186 | 49.2 | 15.2 | 13.4 | 23.0 | 0.0 | 1.1 |
| Muslim | 37 | (68.4) | (10.4) | (3.9) | (60.7) | (0.0) | (0.0) |
| Total | 1,865 | 64.1 | 12.7 | 13.2 | 49.4 | 1.2 | 0.7 |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with cawution.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice-cream
${ }^{\mathrm{b}}$ Such as soft drinks, juice drinks, and other drinks with added sugar purchased from market
${ }^{\text {c }}$ Such as soft drinks, juice drinks, and other drinks with added sugar made at home
${ }^{\mathrm{d}}$ Tea mixed with ghee and salt

Table 5.14: Consumption of Fats the Day Preceeding the Survey among Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

$\left.$| Characteristics |  | N | Cooking Oil | Vegetable Ghee |
| :--- | :---: | :---: | :---: | :---: | | Other Fats (Butter, Animal fat, |
| :---: |
| Animal ghee) | \right\rvert\, | \% |
| :---: |

Table 5.15: Consumption of Uncooked Rice, Starch or Ice, and any PICA Syndrome during 7 Days Prior to the Survey among Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumption of Uncooked Rice, Starch or Ice |  |  | Any PICA Syndrome ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 357 | 8.7 | (5.6-13.4) |  | 8.7 | (5.6-13.4) |  |
| Central | 357 | 7.7 | (4.4-13.3) |  | 8.1 | (4.8-13.4) |  |
| Western | 353 | 7.1 | (4.8-10.4) | <0.001 | 7.3 | (4.9-10.7) | <0.001 |
| Mid-western | 383 | 11.5 | (8.5-15.3) |  | 11.5 | (8.5-15.3) |  |
| Far-western | 415 | 40.6 | (33.2-48.5) |  | 40.6 | (33.2-48.5) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 291 | 20.7 | (16.3-26.0) |  | 20.7 | (16.3-26.0) |  |
| Hill | 782 | 7.2 | (6.0-8.7) | <0.001 | 7.2 | (6.0-8.7) | <0.001 |
| Terai | 792 | 15.1 | (11.6-19.4) |  | 15.4 | (11.9-19.6) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 216 | 15.7 | (8.8-26.5) | 0.090 | 15.7 | (8.8-26.5) | 0.106 |
| Rural | 1649 | 11.7 | (9.7-13.9) | 0.090 | 11.8 | (9.9-14.0) | 0.106 |
| Age, years |  |  |  |  |  |  |  |
| 10-11 | 343 | 16.9 | (12.6-22.2) |  | 16.9 | (12.6-22.2) |  |
| 12-13 | 444 | 12.0 | (8.5-16.9) |  | 12.0 | (8.5-16.9) |  |
| 14-15 | 404 | 10.7 | (8.4-13.6) | 0.039 | 10.7 | (8.4-13.6) | 0.062 |
| 16-17 | 330 | 11.0 | (8.0-15.1) |  | 11.0 | (8.0-15.1) |  |
| 18-19 | 344 | 10.0 | (7.5-13.2) |  | 10.8 | (8.3-14.1) |  |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 494 | 13.3 | (10.2-17.1) |  | 13.3 | (10.2-17.1) |  |
| Second | 429 | 9.3 | (6.5-13.3) |  | 9.3 | (6.5-13.3) |  |
| Middle | 338 | 10.8 | (7.3-15.8) | 0.193 | 11.4 | (7.8-16.3) | 0.214 |
| Fourth | 330 | 13.2 | (9.2-18.4) |  | 13.4 | (9.4-18.6) |  |
| Highest | 274 | 14.3 | (10.0-20.0) |  | 14.3 | (10.0-20.0) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 220 | 11.5 | (7.6-16.8) |  | 11.5 | (7.6-16.8) |  |
| Hill Chhetri | 446 | 16.8 | (12.6-22.1) |  | 16.8 | (12.6-22.1) |  |
| Terai Brahmin/Chhetri | 43 | (5.4) | (2.2-12.5) |  | (5.4) | (2.2-12.5) |  |
| Other Terai Caste | 128 | 12.0 | (5.1-25.9) |  | 12.3 | (5.3-26.1) |  |
| Hill Dalit | 234 | 16.1 | (10.0-24.9) | <0.001 | 16.1 | (10.0-24.9) | <0.001 |
| Terai Dalit | 94 | 12.3 | (5.5-25.3) | <0.001 | 13.9 | (7.5-24.5) | <0.001 |
| Newar | 58 | 9.3 | (3.7-21.5) |  | 9.3 | (3.7-21.5) |  |
| Hill Janajati | 419 | 5.1 | (3.6-7.2) |  | 5.1 | (3.6-7.2) |  |
| Terai Janajati | 186 | 21.8 | (14.4-31.6) |  | 21.8 | (14.4-31.6) |  |
| Muslim | 37 | (5.6) | (1.4-19.8) |  | (5.6) | (1.4-19.8) |  |
| Total | 1,865 | 12.1 | (10.2-14.3) |  | 12.2 | (10.4-14.4) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Consumption of clay, earth, termite mounds, uncooked rice, starch or ice. |  |  |  |  |  |  |  |

Table 5.16: Minimum Dietary Diversity the Day Preceeding the Survey among Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumed Minimum Dietary Diversity ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Regions |  |  |  |  |
| Eastern | 472 | 48.1 | (42.1-54.2) |  |
| Central | 473 | 53.2 | (46.9-59.5) |  |
| Western | 465 | 49.3 | (43.6-55.0) | 0.001 |
| Mid-western | 475 | 39.5 | (34.9-44.4) |  |
| Far-western | 466 | 45.8 | (38.8-53.0) |  |
| Ecological Region |  |  |  |  |
| Mountain | 381 | 38.4 | (30.6-46.8) |  |
| Hill | 984 | 51.2 | (47.5-54.8) | 0.011 |
| Terai | 986 | 48.1 | (43.1-53.1) |  |
| Location |  |  |  |  |
| Urban | 322 | 60.2 | (50.0-69.6) | 0.001 |
| Rural | 2,029 | 47.0 | (43.4-50.7) | , |
| Age, Years |  |  |  |  |
| 15-19 | 273 | 37.2 | (30.2-44.8) |  |
| 20-29 | 1,003 | 51.0 | (47.2-54.8) | 0.001 |
| 30-39 | 696 | 50.0 | (45.2-54.9) | 0.001 |
| 40-49 | 379 | 48.0 | (41.6-54.5) |  |
| Lactating Status <br> (among those who had given birth in the last 5 years) |  |  |  |  |
|  |  |  |  |  |  |
| Yes | 595 | 44.4 | (40.5-48.3) | 0.003 |
| No | 235 | 55.7 | (49.1-62.1) | 0.003 |
| Pregnancy Status |  |  |  |  |
| Pregnant | 207 | 49.4 | (42.0-56.9) | 0.883 |
| Non-pregnant | 2,144 | 48.7 | (45.4-52.1-) | 0.883 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |
| First trimester | 57 | 48.4 | (39.3-57.5) |  |
| Second trimester | 75 | 46.9 | (36.6-57.4) | 0.755 |
| Third trimester | 75 | 52.6 | (41.6-63.4) |  |
| Education |  |  |  |  |
| No education | 756 | 35.2 | (31.4-39.3) |  |
| Primary | 406 | 46.0 | (41.0-51.1) | 0.001 |
| Some secondary | 614 | 51.5 | (47.0-56.0) | 0.001 |
| SLC and above | 575 | 63.4 | (57.7-68.7) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 531 | 31.1 | (26.8-35.8) |  |
| Second | 491 | 34.4 | (29.6-39.6) |  |
| Middle | 456 | 45.6 | (41.1-50.2) | <0.001 |
| Fourth | 454 | 52.0 | (44.7-59.2) |  |
| Highest | 419 | 71.2 | (63.0-78.2) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 297 | 66.5 | (57.5-74.4) |  |
| Hill Chhetri | 565 | 54.6 | (48.4-60.8) |  |
| Terai Brahmin/Chhetri | 64 | 55.8 | (30.0-78.9) |  |
| Other Terai caste | 156 | 35.6 | (29.6-42.1) |  |
| Hill Dalit | 295 | 44.9 | (37.9-52.0) | <0.001 |
| Terai Dalit | 106 | 31.9 | (25.0-39.7) | <0.001 |
| Newar | 80 | 62.1 | (49.1-73.6) |  |
| Hill Janajati | 528 | 44.7 | (39.6-49.9) |  |
| Terai Janajati | 210 | 41.8 | (32.4-51.9) |  |
| Muslim | 48 | (51.1) | (33.6-68.5) |  |
| Total | 2,351 | 48.8 | (45.7-51.9) |  |

[^18]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Defined as consuming food items from at least five out of ten defined food groups the previous day or night. The 10 food groups are: Grains, white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetables; Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits. FANTA, 2016

| Characteristics | N | Food made from grains | Roots and tubers | Legumes | Nuts and Seeds | $\begin{aligned} & \text { Dairy } \\ & \text { products } \end{aligned}$ | Meat ${ }^{\text {b }}$ | Liver, kidney, heart or other organ meat | Eggs | Fish | Dark green leafy vegetables | Vitamin A rich vegetables | $\begin{gathered} \text { Other } \\ \text { vegetables } \end{gathered}$ | Vitamin A rich fruits | Other fruits |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 472 | 99.3 | 90.3 | 66.6 | 7.7 | 42.5 | 22.3 | 8.0 | 8.6 | 7.5 | 62.5 | 7.1 | 78.3 | 9.0 | 32.2 |
| Central | 473 | 99.5 | 86.9 | 76.0 | 6.4 | 45.9 | 28.6 | 5.9 | 10.9 | 4.1 | 52.7 | 13.8 | 85.8 | 18.5 | 34.4 |
| Western | 465 | 99.8 | 87.9 | 77.5 | 7.5 | 46.4 | 29.2 | 5.0 | 13.5 | 6.1 | 36.4 | 11.0 | 79.9 | 13.8 | 37.0 |
| Mid-western | 475 | 100.0 | 79.4 | 69.4 | 4.1 | 34.2 | 23.6 | 8.3 | 9.7 | 3.9 | 41.8 | 7.9 | 77.6 | 11.7 | 37.0 |
| Far-western | 466 | 99.8 | 72.7 | 75.9 | 3.4 | 44.6 | 17.7 | 7.7 | 6.8 | 6.1 | 46.7 | 10.8 | 81.3 | 11.9 | 40.3 |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 381 | 99.6 | 73.9 | 64.3 | 6.4 | 36.2 | 26.2 | 8.5 | 13.5 | 1.9 | 52.2 | 6.7 | 73.3 | 3.6 | 32.9 |
| Hill | 984 | 98.6 | 80.1 | 71.3 | 6.2 | 43.7 | 31.0 | 7.7 | 12.0 | 4.0 | 56.0 | 9.0 | 80.4 | 17.3 | 39.1 |
| Terai | 986 | 99.9 | 91.6 | 76.0 | 6.5 | 44.3 | 21.1 | 5.6 | 8.6 | 7.0 | 44.4 | 12.5 | 83.3 | 12.3 | 32.3 |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 322 | 99.3 | 91.0 | 79.6 | 11.0 | 50.1 | 25.5 | 5.4 | 13.1 | 5.9 | 47.4 | 16.6 | 87.9 | 19.4 | 42.7 |
| Rural | 2,029 | 99.5 | 84.8 | 72.3 | 5.6 | 42.5 | 25.6 | 6.9 | 9.9 | 5.3 | 50.2 | 9.8 | 80.5 | 13.1 | 34.1 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 273 | 98.8 | 87.0 | 68.1 | 6.9 | 39.8 | 22.7 | 5.5 | 10.6 | 4.8 | 48.0 | 5.9 | 72.7 | 9.2 | 29.0 |
| 20-29 | 1,003 | 99.7 | 84.8 | 72.5 | 6.5 | 42.3 | 29.4 | 7.6 | 13.5 | 6.3 | 49.9 | 11.6 | 84.5 | 13.6 | 35.7 |
| 30-39 | 696 | 100.0 | 85.8 | 75.0 | 5.8 | 44.3 | 22.9 | 6.2 | 7.5 | 4.4 | 51.0 | 11.7 | 79.4 | 15.6 | 34.2 |
| 40-49 | 379 | 99.6 | 86.6 | 75.4 | 6.6 | 48.0 | 22.5 | 5.7 | 7.1 | 5.2 | 48.5 | 9.3 | 83.1 | 14.6 | 40.2 |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 756 | 99.9 | 82.8 | 70.4 | 3.4 | 32.8 | 22.7 | 6.4 | 5.0 | 6.3 | 44.7 | 7.1 | 77.9 | 9.1 | 27.4 |
| Primary ${ }^{\text {d }}$ | 406 | 99.2 | 82.5 | 72.7 | 5.4 | 38.7 | 26.9 | 4.8 | 9.0 | 5.7 | 52.1 | 9.0 | 74.9 | 14.8 | 31.6 |
| Some secondary ${ }^{\text {e }}$ | 614 | 99.7 | 85.8 | 72.5 | 5.7 | 46.2 | 24.8 | 8.1 | 13.2 | 5.3 | 51.7 | 11.5 | 82.3 | 14.0 | 35.9 |
| SLC and above ${ }^{\text {f }}$ | 575 | 99.7 | 90.6 | 77.7 | 11.0 | 56.3 | 28.9 | 6.9 | 14.5 | 4.4 | 52.3 | 15.0 | 88.8 | 18.8 | 45.8 |
| Literate ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Able to read entire sentence | 304 | 99.3 | 80.8 | 69.3 | 5.3 | 39.7 | 26.7 | 6.3 | 9.9 | 5.2 | 49.9 | 8.6 | 76.1 | 13.7 | 34.7 |
| Read part of sentence | 308 | 99.7 | 79.3 | 72.8 | 3.9 | 34.8 | 27.9 | 5.2 | 5.0 | 6.3 | 51.7 | 8.8 | 77.8 | 14.5 | 29.4 |
| Cannot read any of sentence | 546 | 99.9 | 85.2 | 71.3 | 3.6 | 32.6 | 21.3 | 5.8 | 5.2 | 6.5 | 43.8 | 6.9 | 77.0 | 8.1 | 25.7 |
| Marital Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Never married | 302 | 99.6 | 87.5 | 74.3 | 6.7 | 42.7 | 22.1 | 3.2 | 14.5 | 8.1 | 51.1 | 11.3 | 80.9 | 16.2 | 32.1 |
| Married/Union | 2,014 | 99.7 | 85.4 | 73.2 | 6.3 | 43.9 | 26.1 | 7.1 | 9.6 | 5.1 | 49.6 | 10.5 | 81.5 | 13.6 | 35.9 |
| Divorced/Separated | 7 |  |  |  | * |  |  |  | * | * |  | * |  | * | * |
| Widowed | 28 | (100.0) | (77.5) | (60.2) | (0.0) | (25.7) | (31.4) | (19.1) | (8.0) | (2.5) | (41.3) | (6.4) | (82.6) | (6.5) | (18.6) |
| Pregnancy Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 207 | 99.6 | 86.5 | 65.9 | 10.3 | 43.1 | 22.8 | 4.1 | 12.2 | 4.8 | 53.5 | 12.8 | 78.9 | 16.7 | 38.6 |
| Non-pregnant | 2,144 | 99.7 | 85.5 | 74.0 | 6.0 | 43.6 | 25.9 | 6.9 | 10.2 | 5.5 | 49.5 | 10.5 | 81.7 | 13.6 | 34.9 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First trimester | 57 | 98.4 | 80.7 | 61.6 | 11.9 | 31.0 | 23.5 | 2.6 | 8.1 | 2.7 | 51.3 | 9.6 | 77.7 | 17.9 | 36.3 |
| Second trimester | 75 | 100.0 | 89.6 | 66.6 | 10.4 | 48.0 | 25.6 | 3.0 | 6.1 | 5.6 | 49.3 | 17.4 | 82.6 | 16.1 | 41.5 |
| Third trimester | 75 | 100.0 | 87.5 | 68.1 | 9.1 | 46.7 | 19.5 | 6.2 | 21.0 | 5.6 | 59.3 | 10.5 | 76.0 | 16.5 | 37.4 |

Table 5.17: Cont'd...

| Characteristics | N | Food made from grains | Roots and tubers | Legumes | Nuts and Seeds | Dairy products | Meat ${ }^{\text {c }}$ | Liver, kidney, heart or other organ meat | Eggs | Fish | Dark green leafy vegetables | $\begin{gathered} \hline \text { Vitamin } \mathrm{A} \\ \text { rich } \\ \text { vegetables } \\ \hline \end{gathered}$ | Other vegetables | Vitamin A rich fruits | Other fruits |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% | \% |
| Lactating Status (among those who had given birth in the last 5 years) <br> Yes <br> No | $\begin{aligned} & 595 \\ & 235 \end{aligned}$ | $\begin{array}{r} 99.5 \\ 100.0 \\ \hline \end{array}$ | $\begin{aligned} & 85.3 \\ & 79.7 \end{aligned}$ | $\begin{aligned} & 72.3 \\ & 73.7 \end{aligned}$ | $\begin{aligned} & 5.2 \\ & 5.9 \end{aligned}$ | $\begin{aligned} & 39.2 \\ & 44.3 \end{aligned}$ | $\begin{aligned} & 30.4 \\ & 30.4 \end{aligned}$ | $\begin{aligned} & 9.8 \\ & 8.5 \end{aligned}$ | $\begin{aligned} & 10.1 \\ & 11.3 \end{aligned}$ |  | $\begin{aligned} & 46.3 \\ & 54.3 \end{aligned}$ | $\begin{array}{r} 8.6 \\ 12.6 \\ \hline \end{array}$ | $\begin{aligned} & 83.0 \\ & 82.2 \end{aligned}$ | $\begin{array}{r} 9.2 \\ 19.1 \\ \hline \end{array}$ | $\begin{aligned} & 31.4 \\ & 35.6 \\ & \hline \end{aligned}$ |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 531 \\ & 491 \\ & 456 \\ & 454 \\ & 419 \\ & \hline \end{aligned}$ | $\begin{array}{r} 100.0 \\ 100.0 \\ 99.6 \\ 99.4 \\ 99.6 \\ \hline \end{array}$ | $\begin{aligned} & 70.7 \\ & 80.3 \\ & 89.0 \\ & 89.4 \\ & 93.1 \\ & \hline \end{aligned}$ | $\begin{aligned} & 62.6 \\ & 66.7 \\ & 71.0 \\ & 78.5 \\ & 82.6 \\ & \hline \end{aligned}$ | $\begin{array}{r} 3.0 \\ 4.2 \\ 5.1 \\ 5.7 \\ 11.8 \\ \hline \end{array}$ | $\begin{aligned} & 32.7 \\ & 37.7 \\ & 35.7 \\ & 47.0 \\ & 58.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & 23.7 \\ & 24.9 \\ & 24.2 \\ & 25.1 \\ & 29.0 \\ & \hline \end{aligned}$ | $\begin{aligned} & 7.3 \\ & 5.9 \\ & 8.5 \\ & 6.1 \\ & 5.9 \\ & \hline \end{aligned}$ | $\begin{array}{r} 5.2 \\ 7.4 \\ 11.8 \\ 8.7 \\ 16.2 \\ \hline \end{array}$ | $\begin{aligned} & 5.6 \\ & 3.1 \\ & 6.7 \\ & 5.8 \\ & 5.6 \\ & \hline \end{aligned}$ | $\begin{aligned} & 48.4 \\ & 49.5 \\ & 49.0 \\ & 45.3 \\ & 55.7 \\ & \hline \end{aligned}$ | $\begin{array}{r} 4.4 \\ 3.2 \\ 8.8 \\ 13.0 \\ 20.0 \\ \hline \end{array}$ | $\begin{aligned} & 69.7 \\ & 78.0 \\ & 80.5 \\ & 85.9 \\ & 88.6 \\ & \hline \end{aligned}$ | $\begin{array}{r} 7.9 \\ 8.2 \\ 13.4 \\ 12.0 \\ 24.4 \\ \hline \end{array}$ | $\begin{aligned} & 31.4 \\ & 26.2 \\ & 28.7 \\ & 36.7 \\ & 48.9 \\ & \hline \end{aligned}$ |
| Ethnicity Hill Brahmin Hill Chhetri Terai Brahmin/Chhetri Other Terai Caste Hill Dalit Terai Dalit Newar Hill Janajati Terai Janajati Muslim | $\begin{array}{r} 297 \\ 565 \\ 64 \\ 156 \\ 295 \\ 106 \\ 80 \\ 528 \\ 210 \\ 48 \\ \hline \end{array}$ | 99.5 100.0 100.0 98.8 100.0 98.8 100.0 99.9 100.0 $(100.0)$ | 91.1 84.2 98.3 96.1 68.5 93.5 85.0 78.8 86.6 $(96.7)$ | 82.8 73.5 82.4 86.0 76.1 68.2 70.7 63.4 64.7 $(78.6)$ | 9.0 4.4 12.8 5.0 6.8 4.9 15.1 4.8 5.5 $(4.9)$ | 72.5 <br> 50.2 <br> 50.7 <br> 46.2 <br> 32.9 <br> 32.9 <br> 47.6 <br> 28.7 <br> 31.4 <br> $(45.9)$ | 15.0 23.3 10.4 6.7 36.6 14.1 39.5 43.9 22.8 $(24.6)$ | 3.9 6.6 3.3 0.0 12.1 5.9 15.2 9.3 5.0 $(6.8)$ | 7.3 11.7 2.8 2.0 9.9 9.5 29.0 13.4 8.5 $(13.9)$ | $\begin{array}{r} 2.8 \\ 3.0 \\ 3.0 \\ 7.0 \\ 5.1 \\ 5.9 \\ 4.0 \\ 6.0 \\ 12.0 \\ (8.2) \\ \hline \end{array}$ | 51.3 53.1 61.9 38.0 52.8 40.5 59.5 53.0 43.1 $(45.7)$ | 11.6 11.8 22.3 11.5 8.9 3.9 23.5 5.6 12.8 $(13.2)$ | 84.6 82.7 82.7 85.4 80.9 65.8 86.2 80.7 81.3 $(78.8)$ | $\begin{array}{r} 22.0 \\ 16.3 \\ 13.1 \\ 8.9 \\ 9.7 \\ 4.2 \\ 40.4 \\ 10.9 \\ 9.3 \\ (9.9) \\ \hline \end{array}$ | 50.0 41.7 48.0 22.7 32.5 22.7 32.6 33.1 29.7 $(28.7)$ |
| Total | 2,351 | 99.7 | 85.6 | 73.3 | 6.4 | 43.6 | 25.6 | 6.7 | 10.3 | 5.4 | 49.8 | 10.7 | 81.5 | 13.9 | 35.3 |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution.

Sample size might vary slightly due to missing data.
${ }^{\text {b }}$ Meat (chicken, goat, buffalo, pig or duck)
'Meat (chicken, goat, buffalo, pig or duck
'Includes those who have never attended school.
dIncludes those who have completed 0-5 years of school.
eIncludes those who have completed 6-9 years of school.
Includes those who have completed 10 and more years of
'Includes those who have completed 6-9 years of school.
fincludes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 5.18: Consumption of Specific Foods and Beverages the Day Preceeding the Survey among Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sweet foods ${ }^{\text {a }}$ | Sugar <br> sweetened <br> beverages from <br> market ${ }^{\text {b }}$ | Sugar sweetened beverages made at home ${ }^{\text {c }}$ | Tea | $\begin{array}{\|c\|} \hline \text { Tibetan } \\ \text { Tea }^{\mathrm{d}} \end{array}$ | Coffee |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 472 | 47.6 | 10.9 | 12.5 | 56.7 | 1.4 | 1.0 |
| Central | 473 | 52.2 | 15.1 | 14.0 | 60.0 | 0.9 | 1.8 |
| Western | 465 | 61.2 | 15.6 | 16.4 | 76.9 | 0.8 | 1.0 |
| Mid-western | 475 | 42.0 | 6.7 | 6.6 | 41.1 | 0.6 | 0.5 |
| Far-western | 466 | 54.4 | 8.6 | 9.5 | 52.7 | 0.0 | 0.3 |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 381 | 58.0 | 9.9 | 7.9 | 60.9 | 3.7 | 0.6 |
| Hill | 984 | 56.9 | 12.3 | 11.8 | 67.8 | 1.4 | 1.7 |
| Terai | 986 | 46.6 | 13.0 | 14.0 | 52.0 | 0.1 | 0.8 |
| Location |  |  |  |  |  |  |  |
| Urban | 322 | 62.1 | 18.0 | 13.9 | 72.1 | 0.6 | 1.8 |
| Rural | 2,029 | 50.1 | 11.7 | 12.5 | 57.3 | 0.9 | 1.1 |
| Age, years |  |  |  |  |  |  |  |
| 15-19 | 273 | 59.7 | 11.2 | 17.0 | 49.8 | 0.3 | 1.1 |
| 20-29 | 1,003 | 55.0 | 13.4 | 11.0 | 58.5 | 1.1 | 1.6 |
| 30-39 | 696 | 47.7 | 13.1 | 13.5 | 61.9 | 0.9 | 1.0 |
| 40-49 | 379 | 45.1 | 10.0 | 12.8 | 62.9 | 0.6 | 0.2 |
| Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {f }}$ | 756 | 36.0 | 8.6 | 7.6 | 44.7 | 1.1 | 0.4 |
| Primary ${ }^{\text {b }}$ | 406 | 45.1 | 9.1 | 11.7 | 53.1 | 1.1 | 0.7 |
| Some secondary ${ }^{\text {h }}$ | 614 | 57.7 | 12.8 | 16.1 | 66.0 | 0.9 | 1.3 |
| SLC and above ${ }^{\text {i }}$ | 575 | 68.0 | 18.9 | 15.8 | 73.4 | 0.5 | 2.1 |
| Literate ${ }^{\text {e }}$ |  |  |  |  |  |  |  |
| Able to read entire sentence | 304 | 46.0 | 9.0 | 7.2 | 58.0 | 0.3 | 0.5 |
| Read part of sentence | 308 | 43.2 | 8.3 | 11.7 | 49.6 | 1.7 | 0.8 |
| Cannot read any of sentence | 546 | 33.6 | 8.9 | 10.3 | 41.4 | 1.2 | 0.4 |
| Marital Status |  |  |  |  |  |  |  |
| Never married | 302 | 62.2 | 15.3 | 16.4 | 58.1 | 0.3 | 3.4 |
| Married/Union | 2,014 | 50.1 | 12.0 | 12.3 | 59.5 | 1.0 | 0.8 |
| Divorced/Separated | 7 | * | * | * | * | * | * |
| Widowed | 28 | (40.5) | (24.3) | (2.6) | (48.5) | (0.2) | (0.0) |
| Pregnancy Status |  |  |  |  |  |  |  |
| Pregnant | 207 | 45.0 | 11.0 | 11.6 | 49.8 | 0.7 | 0.4 |
| Non-pregnant | 2144 | 52.4 | 12.8 | 12.8 | 60.2 | 0.9 | 1.2 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |
| First trimester | 57 | 53.2 | 10.7 | 7.8 | 54.4 | 0.0 | 1.4 |
| Second trimester | 75 | 40.0 | 7.2 | 10.9 | 43.0 | 0.0 | 0.0 |
| Third trimester | 75 | 44.3 | 14.9 | 14.8 | 53.4 | 2.0 | 0.0 |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |
| Yes | 595 | 52.4 | 13.4 | 7.6 | 56.5 | 1.5 | 1.2 |
| No | 235 | 55.2 | 12.8 | 16.7 | 63.8 | 0.5 | 0.0 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 531 | 40.3 | 3.8 | 3.4 | 42.5 | 1.5 | 0.4 |
| Second | 491 | 43.3 | 6.5 | 7.0 | 55.0 | 1.1 | 0.7 |
| Middle | 456 | 45.3 | 10.0 | 9.4 | 50.2 | 0.5 | 0.9 |
| Fourth | 454 | 52.2 | 13.9 | 16.7 | 59.9 | 0.0 | 0.8 |
| Highest | 419 | 70.5 | 23.7 | 22.3 | 80.6 | 1.4 | 2.5 |

Table 5.18: Cont'd...

| Characteristics |  | N | Sweet foods ${ }^{\text {a }}$ | Sugar <br> sweetened <br> beverages from <br> market $^{\mathbf{b}}$ | Sugar sweetened beverages made at home ${ }^{\text {c }}$ | Tea | $\begin{array}{\|c\|} \hline \text { Tibetan } \\ \text { Tea }^{\text {d }} \end{array}$ | Coffee |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% | \% | \% | \% |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin |  | 297 | 70.2 | 12.2 | 20.3 | 85.5 | 0.7 | 1.7 |
| Hill Chhetri |  | 565 | 57.2 | 13.5 | 13.8 | 71.4 | 0.6 | 1.8 |
| Terai Brahmin/Chhetri |  | 64 | 57.9 | 12.8 | 23.0 | 67.3 | 0.0 | 0.0 |
| Other Terai Caste |  | 156 | 39.0 | 7.5 | 10.5 | 39.1 | 0.6 | 0.9 |
| Hill Dalit |  | 295 | 50.7 | 8.9 | 7.2 | 58.6 | 0.3 | 0.0 |
| Terai Dalit |  | 106 | 32.5 | 6.7 | 7.2 | 37.9 | 0.0 | 0.0 |
| Newar |  | 80 | 75.6 | 26.5 | 21.8 | 84.3 | 0.0 | 1.7 |
| Hill Janajati |  | 528 | 49.7 | 15.9 | 11.9 | 54.0 | 2.6 | 1.2 |
| Terai Janajati |  | 210 | 33.8 | 10.4 | 5.2 | 32.6 | 0.3 | 1.7 |
| Muslim |  | 48 | (49.0) | (10.0) | (9.8) | (60.7) | (0.0) | (0.0) |
|  | Total | 2,351 | 51.7 | 12.5 | 12.7 | 59.3 | 0.9 | 1.2 |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice-cream
${ }^{\mathrm{b}}$ Such as soft drinks, juice drinks, and other drinks with added sugar purchased from market
${ }^{\text {c }}$ Such as soft drinks, juice drinks, and other drinks with added sugar made at home
${ }^{\mathrm{d}}$ Tea mixed with ghee and salt
${ }^{\text {e }}$ Those with less than a $5^{\mathrm{th}}$ year completed education asked to read a sentence on a card.
Other includes: blind/visually impaired and sentence not available in required language.
${ }^{\text {f }}$ Includes those who have never attended school.
${ }^{\mathrm{g}}$ Includes those who have completed 0-5 years of school.
${ }^{\mathrm{h}}$ Includes those who have completed 6-9 years of school.
${ }^{i}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 5.19: Consumption of Fats the day Preceeding the Survey among Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Cooking oil | Vegetable ghee | Other fats (butter, animal fat, animal ghee) |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | \% | \% |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 472 \\ & 473 \\ & 465 \\ & 475 \\ & 466 \end{aligned}$ | $\begin{aligned} & 95.9 \\ & 96.9 \\ & 96.5 \\ & 95.5 \\ & 98.8 \end{aligned}$ | $\begin{aligned} & 1.4 \\ & 1.3 \\ & 2.7 \\ & 3.6 \\ & 1.1 \end{aligned}$ | $\begin{array}{r} 11.6 \\ 10.0 \\ 25.3 \\ 8.5 \\ 19.6 \end{array}$ |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 381 \\ & 984 \\ & 986 \\ & \hline \end{aligned}$ | $\begin{aligned} & 98.1 \\ & 97.6 \\ & 95.6 \end{aligned}$ | $\begin{aligned} & 1.0 \\ & 1.7 \\ & 2.1 \\ & \hline \end{aligned}$ | $\begin{array}{r} 18.8 \\ 20.3 \\ 8.1 \\ \hline \end{array}$ |
| Location <br> Urban <br> Rural | $\begin{array}{r} 322 \\ 2,029 \end{array}$ | $\begin{aligned} & 98.4 \\ & 96.3 \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 1.8 \end{aligned}$ | $\begin{aligned} & 14.6 \\ & 13.9 \end{aligned}$ |
| $\begin{array}{\|r} \hline \text { Age, years } \\ 15-19 \\ 20-29 \\ 30-39 \\ 40-49 \\ \hline \end{array}$ | $\begin{array}{r} 273 \\ 1,003 \\ 696 \\ 379 \\ \hline \end{array}$ | $\begin{aligned} & 95.4 \\ & 96.4 \\ & 97.2 \\ & 96.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0.6 \\ & 1.8 \\ & 1.4 \\ & 3.9 \\ & \hline \end{aligned}$ | $\begin{aligned} & 12.3 \\ & 14.1 \\ & 14.0 \\ & 14.9 \\ & \hline \end{aligned}$ |
| Education <br> No education ${ }^{\text {b }}$ <br> Primary ${ }^{\text {c }}$ <br> Some secondary ${ }^{\text {d }}$ <br> SLC and above ${ }^{\text {e }}$ | $\begin{aligned} & 756 \\ & 406 \\ & 614 \\ & 575 \end{aligned}$ | $\begin{aligned} & 96.6 \\ & 96.8 \\ & 96.2 \\ & 96.9 \end{aligned}$ | $\begin{aligned} & 2.6 \\ & 1.7 \\ & 1.6 \\ & 1.4 \end{aligned}$ | $\begin{array}{r} 6.5 \\ 10.6 \\ 15.7 \\ 23.0 \end{array}$ |
| Literate ${ }^{\text {a }}$ <br> Able to read entire sentence <br> Read part of sentence <br> Cannot read any of sentence | $\begin{aligned} & 304 \\ & 308 \\ & 546 \end{aligned}$ | $\begin{aligned} & 96.6 \\ & 96.5 \\ & 96.9 \end{aligned}$ | $\begin{aligned} & 3.9 \\ & 1.6 \\ & 1.7 \end{aligned}$ | $\begin{array}{r} 11.4 \\ 7.8 \\ 6.2 \\ \hline \end{array}$ |
| Marital Status <br> Never married <br> Married/Union <br> Divorced/Separated <br> Widowed | $\begin{array}{r} 302 \\ 2,014 \\ 7 \\ 28 \end{array}$ | $\begin{array}{r} 98.4 \\ 96.3 \\ * \\ (100.0) \\ \hline \end{array}$ | $\begin{array}{r} 0.4 \\ 2.1 \\ * \\ (0.0) \end{array}$ | $\begin{array}{r} 15.0 \\ 13.9 \\ * \\ (15.6) \end{array}$ |
| Pregnancy Status <br> Pregnant <br> Non-pregnant | $\begin{array}{r} 207 \\ 2,144 \end{array}$ | $\begin{aligned} & 93.1 \\ & 96.9 \end{aligned}$ | $\begin{aligned} & 1.0 \\ & 1.9 \end{aligned}$ | $\begin{aligned} & 13.4 \\ & 14.0 \end{aligned}$ |
| Trimester of Pregnancy (among pregnant women) <br> First trimester <br> Second trimester <br> Third trimester | $\begin{aligned} & 57 \\ & 75 \\ & 75 \end{aligned}$ | $\begin{aligned} & 94.3 \\ & 95.3 \\ & 90.2 \end{aligned}$ | $\begin{aligned} & 0.0 \\ & 0.5 \\ & 2.3 \\ & \hline \end{aligned}$ | $\begin{aligned} & 14.2 \\ & 12.4 \\ & 13.9 \end{aligned}$ |
| Lactating Status (among those who had given birth in the last 5 years) Yes <br> No | $\begin{aligned} & 595 \\ & 235 \\ & \hline \end{aligned}$ | $\begin{aligned} & 97.2 \\ & 98.1 \end{aligned}$ | $\begin{aligned} & 1.4 \\ & 1.7 \end{aligned}$ | $\begin{array}{r} 14.8 \\ 9.8 \end{array}$ |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 531 \\ & 491 \\ & 456 \\ & 454 \\ & 419 \\ & \hline \end{aligned}$ | $\begin{aligned} & 96.3 \\ & 95.4 \\ & 97.9 \\ & 95.6 \\ & 97.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & 1.9 \\ & 2.3 \\ & 0.9 \\ & 2.3 \\ & 1.9 \\ & \hline \end{aligned}$ | $\begin{aligned} & 13.0 \\ & 10.0 \\ & 13.1 \\ & 12.9 \\ & 19.4 \\ & \hline \end{aligned}$ |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 297 \\ 565 \\ 64 \\ 156 \\ 295 \\ 106 \\ 80 \\ 528 \\ 210 \\ 48 \\ \hline \end{array}$ | 96.6 97.9 97.8 94.3 98.5 93.3 99.7 97.0 95.6 $(90.9)$ | 3.8 0.6 1.1 1.5 1.9 0.6 0.4 1.4 3.4 $(7.3)$ | $\begin{array}{r} 25.6 \\ 20.1 \\ 14.0 \\ 7.8 \\ 12.7 \\ 2.1 \\ 21.5 \\ 12.7 \\ 3.2 \\ (3.8) \\ \hline \end{array}$ |
| Total | 2,351 | 96.6 | 1.9 | 14.0 |

[^19]Table 5.20: Consumption of Uncooked Rice, Starch or Ice, and any PICA Syndrome during 7 Days Prior to the Survey among Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Consumption of Uncooked Rice, Starch or Ice |  |  | Any PICA Syndrome ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 471 | 4.6 | (3.2-6.7) |  | 4.6 | (3.2-6.7) |  |
| Central | 473 | 2.6 | (1.5-4.6) |  | 2.9 | (1.9-4.3) |  |
| Western | 465 | 2.3 | (1.0-5.1) | <0.001 | 2.8 | (1.4-5.6) | <0.001 |
| Mid-western | 475 | 9.1 | (5.7-14.2) |  | 9.3 | (5.9-14.4) |  |
| Far-western | 466 | 20.5 | (16.0-25.8) |  | 20.6 | (16.2-26.0) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 381 | 12.9 | (9.5-17.3) |  | 12.9 | (9.5-17.3) |  |
| Hill | 984 | 3.1 | (2.3-4.1) | $<0.001$ | 3.2 | (2.4-4.2) | <0.001 |
| Terai | 985 | 6.7 | (5.0-8.9) |  | 7.0 | (5.4-9.1) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 322 | 5.0 | (3.0-8.2) | 0.697 | 5.0 | (3.0-8.2) | 0.576 |
| Rural | 2,028 | 5.6 | (4.5-7.0) | 0.697 | 5.8 | (4.8-7.2) | . 576 |
| Age, years |  |  |  |  |  |  |  |
| 15-19 | 273 | 11.9 | (8.6-16.1) |  | 12.4 | (9.1-16.6) |  |
| 20-29 | 1,003 | 6.7 | (5.2-8.5) | <0.001 | 7.1 | (5.6-9.0) | <0.001 |
| 30-39 | 695 | 3.4 | (2.3-5.0) | <0.001 | 3.4 | (2.3-5.0) | <0.001 |
| 40-49 | 379 | 2.1 | (1.0-4.3) |  | 2.1 | (1.0-4.3) |  |
| Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 756 | 4.3 | (3.1-6.0) |  | 4.6 | (3.3-6.2) |  |
| Primary ${ }^{\text {d }}$ | 405 | 5.9 | (3.8-9.3) |  | 6.2 | (3.9-9.5) | 0.132 |
| Some secondary ${ }^{\text {e }}$ | 614 | 7.3 | (5.2-10.1) | 0.088 | 7.5 | (5.4-10.2) | 0.132 |
| SLC and above ${ }^{\text {f }}$ | 575 | 4.8 | (3.3-6.9) |  | 5.1 | (3.5-7.3) |  |
| Literate ${ }^{\text {b }}$ |  |  |  |  |  |  |  |
| Able to read entire sentence | 303 | 5.3 | (2.9-9.2) |  | 4.8 | (3.4-6.7) |  |
| Read part of sentence | 308 | 5.8 | (3.8-8.9) | 0.754 | 5.8 | (3.8-8.9) | 0915 |
| Cannot read any of sentence | 546 | 4.3 | (2.9-6.3) |  | 5.3 | (2.9-9.2) |  |
| Marital Status |  |  |  |  |  |  |  |
| Never married | 302 | 8.1 | (5.7-11.4) |  | 8.1 | (5.7-11.4) |  |
| Married/Union | 2,013 | 5.1 | (4.1-6.4) | 0.093 | 5.4 | (4.4-6.6) | 0.142 |
| Divorced/Separated | 7 | * | * | . 093 | * |  | .142 |
| Widowed | 28 | (5.2) | (1.2-20.3) |  | (5.2) | (1.2-20.3) |  |
| Pregnancy Status |  |  |  |  |  |  |  |
| Pregnant | 207 | 11.2 | (7.8-15.8) |  | 12.1 | (8.5-17.0) |  |
| Non-pregnant | 2,143 | 5.0 | (4.0-6.2) | <0.001 | 5.1 | (4.2-6.3) | <0.001 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |
| First trimester | 57 | 7.7 | (2.6-20.5) |  | 9.9 | (4.0-22.7) |  |
| Second trimester | 75 | 14.3 | (7.4-26.0) | 0.453 | 14.3 | (7.4-26.0) | 0.682 |
| Third trimester | 75 | 10.4 | (6.3-16.8) |  | 11.5 | (6.6-19.2) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |
| Yes | 595 | 6.5 | (4.4-9.5) | 0.045 | 6.7 | (4.6-9.7) | 0.098 |
| No | 235 | 3.0 | (1.8-5.0) | 045 | 3.7 | (2.1-6.5) | 0.098 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 531 | 7.9 | (5.6-10.9) |  | 8.1 | (5.8-11.2) |  |
| Second | 491 | 4.1 | (2.5-6.5) |  | 4.1 | (2.5-6.5) |  |
| Middle | 456 | 6.9 | (4.8-9.8) | 0.032 | 6.9 | (4.8-9.8) | 0.020 |
| Fourth | 454 | 5.6 | (4.0-7.6) |  | 6.4 | (4.9-8.4) |  |
| Highest | 419 | 3.9 | (2.6-5.9) |  | 3.9 | (2.6-5.9) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 297 | 2.6 | (1.4-5.0) |  | 2.6 | (1.4-5.0) |  |
| Hill Chhetri | 565 | 8.4 | (6.5-10.7) |  | 8.9 | (6.9-11.3) |  |
| Terai Brahmin/Chhetri | 64 | 2.9 | (1.1-7.5) |  | 2.9 | (1.1-7.5) |  |
| Other Terai Caste | 156 | 4.7 | (2.1-10.2) |  | 5.4 | (2.6-10.9) |  |
| Hill Dalit | 295 | 7.6 | (5.2-11.1) |  | 7.8 | (5.3-11.3) |  |
| Terai Dalit | 106 | 4.3 | (1.6-11.3) | <0.001 | 4.9 | (1.9-11.8) | <0.001 |
| Newar | 80 | 3.2 | (0.9-10.6) |  | 3.2 | (0.9-10.6) |  |
| Hill Janajati | 527 | 2.5 | (1.3-4.7) |  | 2.5 | (1.3-4.7) |  |
| Terai Janajati | 210 | 13.5 | (7.6-22.7) |  | 13.5 | (7.6-22.7) |  |
| Muslim | 48 | (3.0) | (1.0-8.7) |  | (3.0) | (1.0-8.7) |  |
| Total | 2,350 | 5.5 | (4.5-6.7) |  | 5.7 | (4.8-6.9) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data |  |  |  |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Consumption of clay, earth, termite mounds, uncooked rice, starch or ice. |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card. |  |  |  |  |  |  |  |
| ${ }^{\text {' Includes those who have never attended school. }}$ |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |

## Nutrition Interventions

This chapter describes participation of each population group in different ongoing community programs or government interventions. The ongoing government programs include:

- Child growth monitoring for children less than 5 years of age
- Maternal child health and nutrition (MCHN)
- Integrated management of acute malnutrition (IMAM)
- Distribution of micronutrient powders (locally branded as Baal Vita) to children 6-23 months in 15 districts and to children 6-59 months in select earthquake affected districts
- School health and nutrition program
- Mass distribution of biannual vitamin A capsule (children 6-59 months) and deworming tablets (children 12-59 months)
- Distribution of iron-folic acid tablets to pregnant and post-partum women
- Distribution of insecticide treated mosquito nets in malaria endemic areas

In 1997, the government of Nepal initiated a National Vitamin A Program (NVAP) under which children 6-59 months of age are supplemented with vitamin A capsules every six months. By 2002, program coverage had expanded to all districts in the country. Under NVAP, children 611 months receive 100,000 international units (IU) and children 12-59 months receive 200,000 IU of vitamin A biannually. MoHP has since integrated the distribution of deworming tablets to children aged 12 to 59 months into NVAP in all districts.

In 2002 the MoHP developed the National Strategy for the Control of Anemia among Women and Children. Interventions to prevent anemia and iron deficiency include the supplementation of pregnant women with iron and folic acid (IFA). This strategy distributes IFA supplements to pregnant women starting at the beginning of the second trimester of pregnancy and continuing until 45 days postpartum.

Interventions to improve infant and young child feeding (IYCF) include the support of optimal breastfeeding and complementary feeding practices among children 0-24 months of age. The MoHP has an integrated IYCF program including distribution of micronutrient powders (MNP) to children 6-23 months of age in 15 districts with plans for national scale up of the MNP distribution. These MNP, locally branded as Baal Vita, contain multiple micronutrients,
including iron, folic acid, zinc, iodine, copper, selenium, and vitamins A, C, D, E, $\mathrm{B}_{1}, \mathrm{~B}_{2}, \mathrm{~B}_{3}$, $B_{6}$, and $B_{12}$. After a major earthquake in 2015, MNP Baal Vita distribution was also initiated for children aged 6-59 months as part of emergency response in 14 earthquake affected districts, including Gorkha, Makawanpur, Rasuwa, Okhaldhunga, Kathmandu, Bhaktapur, Lalitpur, Kavrepalanchwork, Sindhupalchowk, Dolakha, Ramechhap, Sindhuli, Dhading and Nuwakot.

### 6.1 Participation in Child Growth Monitoring, MCHN, IMAM and IYCF Linked with Cash Grant Program among Children 6-59 Months

Participation was low in the IYCF linked with cash grant program for children 6-23 months, MCHN and IMAM programs; 5 children participated in the IYCF cash grant program and around one percent participated in each of the MCHN or IMAM programs (data not shown). Table 6.1 shows that eight percent children $6-59$ months participated in child growthmonitoring the previous month (last 30 days) as reported by mother or caregiver. Growth monitoring participation varied by developmental region, ecological zone, urban/rural location, age, sex, maternal education, wealth quintile and ethnicity. Participation was around 10 percent in the Central and Mid-western region and three percent in the Eastern region. In the Mountain and Terai, participation was four and six percent, respectively. Among urban children, 12 percent participated in growth monitoring compared to eight percent of rural children. Child growth monitoring was 17 percent among children in the highest wealth quintile and four percent among children in the lowest wealth quintile. By age, participation was highest among the youngest children ( 27 percent of children 6-8 months) and decreased with increasing age (five percent among children $48-59$ months). Compared to male children, female children were less likely to participate in growth monitoring (seven percent versus 10 percent). Among mothers with no education, child growth monitoring was four percent while it was 12 percent among children of mothers with SLC and higher levels of education.

### 6.2 Coverage of Vitamin A, Deworming Tablets, Baal Vita Micronutrient Powders, Iron Supplementation and Zinc Supplementation among Children 6-59 Months

Among children 6-59 months, caregivers reported over nine in ten ( 92 percent) had received a vitamin A capsule during the last mass distribution campaign, and among children 12-59 months, caregivers reported 87 percent had received a deworming tablet in the same campaign (Table 6.2). Vitamin A coverage during the last campaign varied by child age and maternal education, whereas deworming coverage varied by developmental region, ecological zone, child age, and ethnicity. The proportion of children receiving a vitamin A capsule and deworming medicine was lowest among the youngest age groups (vitamin A coverage was 52 percent among children 6-8 months and deworming coverage was 73 percent among children 12-17 months, whereas coverage for both interventions among children 24 months or older was 90 percent or greater). Deworming coverage was 81 percent in the Eastern region and 95 percent in the Far-western region; further, it was 85 percent in the Terai and around 90 percent in the Hill and in the Mountain.

Few children consumed Baal Vita (MNP), iron tablets or syrups, or zinc tablets during the 7 days prior to the survey (data not shown). Overall, caregivers reported that 98 percent of children did not consume Baal Vita in the past 7 days. Among those who were reported to have consumed, only one percent could show any Baal Vita packets while another one percent could not show any packets. Only 8 children had consumed iron tablets or syrup and 13 children had consumed zinc in the past 7 days prior to the survey (data not shown).

### 6.3 Participation in the School Health and Nutrition Program among Children 6-9 Years, Adolescent Boys and Girls aged 10-19 Years

Overall, 17 percent of children 6-9 years had participated in the school health and nutrition program (Table 6.3). Participation in the program varied by developmental region and ethnicity. Among children in the Western region and Far-western region, participation in the program was 24 percent and eight percent, respectively. Among ethnic groups, participation ranged from 23 percent among the Hill Janajati to six percent among the Terai Dalit caste.

Among adolescent boys, 17 percent participated in the school health and nutrition program. Participation varied by development regions. It was 23 percent among boys in the Eastern region, but only 12 percent in Central or Far-western region. Twenty-four percent of the adolescent boys from urban areas had participated in school health and nutrition program while only 16 percent participated from rural area (Table 6.4).

Among adolescent girls, 18 percent participated in the school health and nutrition program, which varied by developmental region, ecological region, age and ethnicity. Girl's participation was 22 percent each in the Eastern region and Mid-western region while it was 14 percent in the Central region. Participation was 19 percent in both Mountain and Hill regions but only 16 percent in Terai region. By age, participation ranged from 21 percent among girls 14-15 years and 13 percent among girls 18-19 years. By ethnicity, close to 30 percent of girls from the Hill Brahmin caste group ( 29 percent) and Terai Brahmin/Chhetri caste group (28 percent) participated, whereas less than five percent of girls from the Newar and Muslim caste groups participated (Table 6.5).

### 6.4 Consumption of Deworming Tablets among Children 6-9 Years

Table 6.6 shows the intake of deworming tablets during the last 6 months prior to the survey among children 6-9 years. Almost two-thirds (66 percent) of children reported that they had taken deworming tablet while one-third reported they did not take the tablet in the past 6 months. Among those children who reported consuming deworming tablet in the last 6 months, 30 percent said they received it from school, eight percent received it from a health facility and 27 percent received it from places other than their school and health facility.

### 6.5 Intake of Micronutrient Supplements and Deworming Tablets among Adolescent Boys 10-19 Years

Among adolescent boys 10-19 years, in the day prior to the survey (or prior 7 days for zinc), no one had consumed any form of single supplement including, iron tablets, folic acid tablets or vitamin A capsules. One boy consumed a multiple micronutrient supplement (data not shown). A total of 13 adolescent boys reported consuming at least one combined iron and folic acid tablet (IFA) during the last 6 months (data not shown).

In the last 6 months, over half ( 53 percent) of adolescent boys 10-19 years had consumed deworming tablets. Among these boys, almost a quarter ( 24 percent) received the tablet from school while three in ten (29 percent) received it from places other than their school (Table 6.7).

### 6.6 Intake of Micronutrient Supplements and Deworming Tablets among Adolescent Girls 10-19 Years

Among 1,865 adolescent girls $10-19$ years, in the previous day of the survey, 14 reported consuming multiple micronutrient supplements, 13 reported consuming iron tablets or syrup, 9 reported consuming folic acid tablets and four reported consuming vitamin A capsule or tablets. In the 7 days prior to the survey, four girls reported taking zinc supplements (data not shown). In the last 6 months, over half ( 54 percent) reported consuming deworming tablet. Among these girls, over two in ten ( 23 percent) received the tablet from school, while three in ten ( 31 percent) reported receiving it from a different location (Table 6.8). A total of 41 adolescent girls reported taking at least one combined IFA during the last six months (data not shown).

### 6.7 Intake of Micronutrient Supplements and Deworming Tablets among Women 15-49 Years

Among 2,351 women 15-49 years, five percent reported taking an IFA supplement the day before the survey. Intake of IFA varied by age, education and pregnancy status of women. Intake of IFA ranged from 11 percent among women 15-19 years to less than one percent among those 40-49 years. Eight percent of women with SLC and above level of education had taken IFA while only two percent with no education consumed it the previous day. Almost half (51 percent) of currently pregnant women reported taking IFA in the previous day. By trimester of pregnancy, seven percent in first trimester, 64 percent in second trimester and 69 percent in third trimester had taken an IFA supplement the previous day (Table 6.9).

Table 6.10 shows the intake of deworming tablet and IFA supplement during the last 6 months. Nationally 40 percent of women reported consuming a deworming tablet and six percent reported consuming an IFA supplement in the past 6 months. Consumption of deworming tablets among women varied by all background characteristics ranging from 23 percent in Central region to 75 percent in Far-western region, 36 percent in Terai to 48 percent in Mountain, 31 percent in urban to 41 percent in rural areas. Intake of deworming tablet significantly decrease with increasing age of the women ( 56 percent among 15-19 years versus 32 percent among 40-49 years). By education intake of deworming tablet range from 47 percent among
some secondary group to 32 percent among primary group. Forty-seven percent of currently pregnant women had taken deworming tablet in the past six months with 23 percent in first trimester, 51 percent in second trimester and 59 percent in third trimester. Higher proportion of women in lowest wealth quintile ( 53 percent) had taken deworming tablet. By ethnicity intake of deworming tablet was highest in Hill Chhetri caste group ( 50 percent).

Intake of IFA supplement in the last six month varied by development region age, education, pregnancy status, wealth quintile and ethnicity. Intake IFA was highest in Mid-western development region (Nine percent), among younger age group of 15-19 years (11 percent), among higher educated ( 12 percent). Twenty-eight percent of pregnant women had taken IFA supplement in the past six month with two percent in first trimester, 36 percent in second trimester and 38 percent in third trimester. Higher proportion of women in highest wealth quintile had taken IFA supplement and by caste group higher proportion of Hill Chhetri and Terai Brahmin/Chhetri (nine percent each) had taken it.

### 6.8 Intake of Iron-folic Acid (IFA) Tablets during Pregnancy among Women 15-49 Years who had Given Birth in the Past 5 Years

A total of 943 women 15-49 years reported giving birth in the 5 years prior to the survey. Among them, nine in ten women 15-49 years ( 91 percent) had consumed IFA during their last pregnancy (Table 6.11). Those women 15-49 years who had consumed IFA were asked about the place from where they obtained these tablets. In response, seven in ten (69 percent) answered at health centers, two in ten ( 23 percent) obtained them from FCHVs and 13 percent bought them from a pharmacy. Women who got the tablets from the health center varied by developmental region, ecological zone, and ethnicity. Approximately 70 percent or more of women got them from health facilities in all development regions except the Mid-western region ( 54 percent). Among women in the Terai, 64 percent got the tablets from health facilities whereas 73 percent got them at that source in the Mountain and in the Hill. The proportion of women 15-49 years who had received the tablets from a FCHV varied by developmental region, urban/rural location, trimester of pregnancy, wealth quintile and ethnicity. It was 46 percent in the Mid-western region and 12 and 14 percent, respectively, in the Central and Eastern regions. FCHV distribution of iron and folic acid tables was 25 percent in rural areas and seven percent in urban areas. Forty percent of women in the lowest wealth quintile got the tablets from FCHV while seven percent of women in the highest wealth quintile got them from FCHV. Women who purchased tablets from the pharmacy varied by developmental region, ecological zone, location, literacy, wealth quintile, and ethnicity. Among women who bought tablets in the pharmacy, 20 and 15 percent did so in the Central and Eastern regions, respectively, and less than seven percent did so in other regions. By ecological zone, 19 percent of women in the Terai purchased from pharmacies while eight and three percent did so in the Hill and Mountain, respectively. Women in urban areas were more likely to purchase them than women in rural areas ( 21 percent versus 12 percent). By wealth quintile, purchasing ranged from three percent among the lowest quintile to 27 percent among women in the highest wealth quintile.

Among those who had consumed any iron and folic acid tablets, almost eight in ten (77 percent) consumed the recommended dose of at least 180 tablets, seven percent consumed 120-179 tablets, eight percent consumed $60-119$ tablets while another eight percent consumed less than 60 tablets. Consumption of the recommended dose of 180 tablets varied by developmental
region and urban/rural location. Among women in the Far-western region, 89 percent consumed the recommended dose and 69 percent did so in the Western region. In urban areas, 85 percent of woman consumed the recommended dose while 76 percent of women did so in rural areas (Table 6.12). Women who had given birth in the five years prior to the survey and had not consumed any iron-folic acid tablets were asked for the reasons for not consuming the tablets. Forty-five percent of them said that they did not know that they needed to consume iron and folic acid tablets during pregnancy. Almost two in ten (18 percent) reported they did not consume them because of side effects and around one in ten (10 percent) said that they did not know where to get the iron-folic acid tablets (Data not shown).

Among women who had given birth in the five years prior to the survey and had consumed some iron and folic acid tablets during the pregnancy but not the recommended 180 doses ( $\mathrm{n}=175$ ) were asked why they did not consume 180 doses. Among these women, 36 percent reported the reason was side effects, 19 percent stated it was because they did not know they should consume 180 tablets, and 14 percent said they forgot. Around one in ten ( 12 percent) said they did not need the tablets while seven percent reported they did not have all 180 tablets (Data not shown).

### 6.9 Intake of Deworming Tablets during Last Pregnancy among Women 15-49 Years who had Given Birth in the Past 5 Years

Table 6.13 shows the percentage of women 15-49 years who consumed deworming medication during their last pregnancy. Overall, six in ten ( 59 percent) reported taking deworming tablets during pregnancy. This varied by developmental region, ecological zone, education, literacy, and ethnicity. Among women in the Far-western and Mid-western regions, 76 percent and 70 percent, respectively, consumed deworming medicine and around 55 percent did so in the other regions. Deworming intake during the last pregnancy was 76 percent in the Mountain and 60 percent and 55 percent in the Hill and Terai, respectively. Intake of deworming medicine was 68 percent among those who have SLC and above level of education while it was 49 percent among those having no education. Deworming medicine intake was lowest among other Terai caste group ( 44 percent).

### 6.10 Intake of Iron-folic Acid (IFA) Tablets during PostPartum Period among Women 15-49 Years Who had Given Birth in the Past 5 Years

Table 6.14 shows the percentage of women 15-49 years who consumed IFA tablets after last delivery among those who had given birth in the last 5 years. Overall, 57 percent consumed iron-folic acid tablets during their last post-partum period. The women who consumed ironfolic acid tablets were asked where they obtained the tablets. Among these women, 65 percent said they got them from health centers, almost a quarter ( 24 percent) from FCHV, while 13 percent bought them from a pharmacy. Receipt from a health center was higher in urban areas ( 76 percent) compared to rural areas ( 63 percent). It also varied by developmental region as 73 percent obtained them from health facilities in the Western region and 45 percent did so in the

Mid-western region. The proportion of women who received the tablets from FCHV was 48 percent in the Mid-western region and nine percent in the Central region. Receipt from FCHV was higher in rural areas ( 27 percent) compared to urban areas (five percent). It also varied by wealth quintile as receipt from FCHV was 45 percent among the lowest wealth quintile group and five percent among the highest wealth quintile group. Almost 20 percent of women in both the Eastern and Central regions reported buying them in pharmacies and three to nine percent reported purchasing in other regions. In the Terai, 21 percent reported purchasing from pharmacies, while eight percent and three percent reported purchasing in the Hill and Mountain, respectively (Table 6.14).

Among those who had consumed the tablets during the last post-partum period, over seven in ten ( 72 percent) reported they consumed the recommended dose of at least 45 IFA tablets, 12 percent consumed 30-44 tablets, eight percent consumed 15-29 tablets while another eight percent consumed less than 15 tablets. Consumption of all recommended doses of 45 tablets post-delivery was 84 and 81 percent, respectively among women in the Far-western and Western regions. It was 63 percent and 67 percent in the Central and Eastern regions, respectively. By ecological zone, 82 percent in the Mountain, 77 percent in the Hill and 64 percent in the Terai consumed at least the recommended number of tablets during last postpartum period (Table 6.15).

Among those who had consumed less than the recommended 45 post-partum iron-folic acid tablets ( $\mathrm{n}=131$ ), reasons for not consuming included that she forgot to consume them (22 percent), she did not have all 45 tablets ( 20 percent), she did not need them ( 19 percent), she did not know that she should consume 45 tablets (17 percent) and side effects (nine percent) (Data not shown).

### 6.11 Intake of Post-Partum Vitamin A Capsule among Women 15-49 Years Who had Given Birth in the Past 5 Years

Consumption of vitamin A capsule during the post-partum period was asked among women 1549 years who had given birth in the last 5 years. Table 6.16 shows that 46 percent of women $15-49$ years consumed the vitamin A capsule and this varied by developmental region, ecological zone, education, ethnicity and wealth quintile. The proportion of women 15-49 years consuming vitamin A was 39 percent in the Eastern region and 59 percent in the Far-western region. It also varied by ecological zone and was 40 percent in the Terai, 51 percent in the Hill and 57 percent in the Mountain. By ethnicity, consumption ranged from 30 percent in the other Terai caste group to 61 percent among the Hill Brahmin group. By wealth quintile, it ranged from 36 percent among the second lowest wealth quintile to 58 percent among the highest wealth quintile.

### 6.12 Infant and Young Child Feeding (IYCF) Counselling Received During Last Pregnancy and Post-Partum Period among Women 15-49 Years Who Had Given Birth in the Past 5 Years

Table 6.17 and 6.18 shows the proportion of women 15-49 years who received counselling on IYCF during their last pregnancy and post-partum period, respectively. Overall, almost half (49 percent) of women 15-49 years who had given birth in the last 5 years reported not receiving IYCF counselling during their pregnancy. Twenty percent each reported they received counselling from FCHV and health workers, and 12 percent of women reported they received the counselling from both a health worker and FCHV during their last pregnancy (Table 6.17).

A total of 43 percent reported not receiving IYCF counselling during post-partum period, while 22 percent and 20 percent respectively, reported receiving it from FCHV and health workers. Fifteen percent of women reported they received IYCF counselling during the post-partum period from both FCHV and health workers (Table 6.18).

### 6.13 Bed Net Use for Malaria Prevention among Children 6-59 Months

Caregivers of children 6-59 months were asked if their child sleeps under a mosquito net during the mosquito season. In response, seven in ten ( 69 percent) women said that their child always sleeps under a net, while seven percent reported that their child sometimes sleeps under a net during the mosquito season. Almost a quarter ( 24 percent) stated that their child never sleeps under a mosquito net (Table 6.19). The proportion of children always sleeping under the mosquito net was significantly higher in the Eastern ( 78 percent), Central ( 77 percent) and Western region ( 77 percent) and lower in the Mid-western (44 percent) and Far-western (40 percent) regions. Over nine in ten ( 91 percent) children in the Terai were reported to always sleep under the net. Children from urban areas were more likely to sleep under a net than children from rural ( 79 percent versus 67 percent). Among those who reported that their child never sleeps under the mosquito net, this ranged from 58 percent for those in the lowest wealth quintile to eight percent among those in the middle wealth quintile and was 39 percent among children whose mothers had no education to 20 percent among children with mothers with some secondary education (Table 6.19).

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Table 6.1: Child Participation in Growth Monitoring among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Participated in Growth Monitoring in the Last Month (Last 30 days) |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 332 | 3.0 | (1.6-5.8) |  |
| Central | 355 | 10.1 | (7.0-14.2) |  |
| Western | 294 | 8.6 | (5.7-12.9) | 0.002 |
| Mid-western | 351 | 10.1 | (7.0-14.2) |  |
| Far-western | 377 | 8.5 | (6.1-11.8) |  |
| Ecological Region |  |  |  |  |
| Mountain | 275 | 3.8 | (2.1-6.8) |  |
| Hill | 707 | 11.3 | (8.6-14.7) | <0.001 |
| Terai | 727 | 6.2 | (4.5-8.5) |  |
| Location |  |  |  |  |
| Urban | 227 | 12.4 | (7.7-19.4) | 0.016 |
| Rural | 1,482 | 7.5 | (6-9.3.0) | 0.016 |
| Age, months |  |  |  |  |
| 6-8 | 73 | 26.5 | (15.8-41.0) |  |
| 9-11 | 88 | 16.0 | (8.6-27.7) |  |
| 12-17 | 182 | 10.4 | (6.2-17.0) |  |
| 18-23 | 166 | 6.5 | (3.1-12.9) | <0.001 |
| 24-35 | 392 | 7.5 | (4.6-11.8) |  |
| 36-47 | 417 | 6.4 | (4.1-9.9) |  |
| 48-59 | 391 | 5.2 | (3.1-8.6) |  |
| 6-23 | 509 | 12.2 | (9.1-16.2) | <0.001 |
| 24-59 | 1,200 | 6.3 | (4.8-8.3) | <0.001 |
| Sex |  |  |  |  |
| Male | 862 | 9.5 | (7.3-12.3) | 0.031 |
| Female | 847 | 6.6 | (4.9-8.9) | 0.031 |
| Maternal Education |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 3.8 | (1.8-7.5) |  |
| Primary ${ }^{\text {b }}$ | 175 | 5.3 | (2.7-10.2) | 0.008 |
| Some secondary ${ }^{\text {c }}$ | 241 | 8.0 | (4.5-13.8) | 0.008 |
| SLC and above ${ }^{\text {d }}$ | 231 | 11.6 | (7.3-18) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 473 | 4.4 | (2.8-7.0) |  |
| Second | 353 | 8.8 | (5.9-12.8) |  |
| Middle | 301 | 5.2 | (3.2-8.4) | <0.001 |
| Fourth | 320 | 6.3 | (3.8-10.2) |  |
| Highest | 262 | 16.7 | (11.7-23.3) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 158 | 11.6 | (6.9-18.8) |  |
| Hill Chhetri | 401 | 9.3 | (6.1-13.9) |  |
| Terai Brahmin/Chhetri | 42 | (2.1) | (0.5-8.9) |  |
| Other Terai Caste | 139 | 2.2 | (0.7-6.7) |  |
| Hill Dalit | 272 | 9.5 | (6.1-14.6) | <0.001 |
| Terai Dalit | 89 | 2.6 | (0.6-9.9) |  |
| Newar | 51 | 20.5 | (10.2-36.9) |  |
| Hill Janajati | 385 | 8.5 | (5.6-12.7) |  |
| Terai Janajati | 120 | 7.7 | (4.1-14.0) |  |
| Muslim | 50 | 15.4 | (5.3-37.0) |  |
| Total | 1,709 | 8.1 | (6.7-9.9) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |
| Sample size might vary slightly due to missing data |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |
| ${ }^{\text {a }}$ Includes those who have never attended school. |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |
| ${ }^{\text {C Includes those who have completed 6-9 years of school. }}$ |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 10 and more years | hool. SL | ol Leaving |  |  |

Table 6.2: Coverage of Vitamin A Supplementation and Deworming Tablets among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Child received vitamin A capsule during last campaign in March 2016 |  |  | Child received deworming tablet during last campaign in March 2016 (12-59 months) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 332 | 89.0 | (84.5-92.3) |  | 80.9 | (75.2-85.6) |  |
| Central | 355 | 92.4 | (88.7-95.0) |  | 88.3 | (83.6-91.7) |  |
| Western | 290 | 94.6 | (91.0-96.9) | 0.088 | 92.0 | (87.7-94.9) | <0.001 |
| Mid-western | 351 | 91.9 | (88.2-94.5) |  | 83.3 | (78.7-87.0) |  |
| Far-western | 377 | 93.1 | (90.0-95.4) |  | 94.9 | (91.8-96.9) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 275 | 94.5 | (90.6-96.9) |  | 90.9 | (86.0-94.2) |  |
| Hill | 707 | 91.8 | (88.8-94.0) | 0.523 | 89.8 | (86.5-92.4) | 0.008 |
| Terai | 723 | 91.9 | (89.4-93.9) |  | 84.7 | (81.2-87.6) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 227 | 90.1 | (84.4-93.9) | 0.248 | 86.3 | (79.0-91.4) |  |
| Rural | 1,478 | 92.4 | (90.5-93.9) | 0.248 | 87.4 | (85.1-89.5) | 0.648 |
| Age, months |  |  |  |  |  |  |  |
| 6-8 | 73 | 52.1 | (38.4-65.4) |  | 0.0 | - |  |
| 9-11 | 88 | 92.2 | (83.1-96.6) |  | 0.0 | - |  |
| 12-17 | 182 | 95.0 | (90.1-97.6) |  | 72.6 | (64.4-79.4) |  |
| 18-23 | 166 | 93.7 | (88.0-96.8) | <0.001 | 90.2 | (87.9-92.2) | <0.001 |
| 24-35 | 391 | 95.1 | (91.2-97.3) |  | 89.6 | (84.8-93.0) |  |
| 36-47 | 416 | 94.1 | (90.7-96.4) |  | 90.8 | (87.0-93.6) |  |
| 48-59 | 389 | 92.1 | (88.0-94.9) |  | 90.2 | (85.7-93.4) |  |
| 6-23 | 509 | 88.2 | (84.4-91.1) | $<0.001$ | 77.8 | (72.1-82.6) |  |
| 24-59 | 1,196 | 93.8 | (91.8-95.3) | <0.001 | 83.8 | (75.4-89.7) | <0.001 |
| Sex |  |  |  |  |  |  |  |
| Male | 862 | 91.8 | (89.3-93.8) | 0.672 | 87.3 | (84.2-89.8) | 0.985 |
| Female | 843 | 92.4 | (89.8-94.3) |  | 87.3 | (83.9-90.1) |  |
| Maternal Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 96.2 | (92.7-98.1) |  | 87.3 | (80.0-92.3) |  |
| Primary ${ }^{\text {b }}$ | 175 | 89.8 | (83.5-93.9) | 0.048 | 88.3 | (82.2-92.5) | 0.202 |
| Some secondary ${ }^{\text {c }}$ | 239 | 90.5 | (84.2-94.5) | 0.048 | 83.3 | (75.6-88.9) | 0.202 |
| SLC and above ${ }^{\text {d }}$ | 231 | 93.8 | (88.2-96.8) |  | 90.0 | (83.6-94.1) |  |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 473 | 90.2 | (86.4-93.0) |  | 90.3 | (86.6-93.1) |  |
| Second | 353 | 93.3 | (89.1-96.0) |  | 89.5 | (84.5-93.1) |  |
| Middle | 300 | 93.0 | (88.3-95.8) | 0.474 | 86.4 | (80.2-90.9) | 0.080 |
| Fourth | 319 | 91.3 | (86.7-94.4) |  | 83.7 | (77.8-88.3) |  |
| Highest | 260 | 92.9 | (88.1-95.8) |  | 86.3 | (80.5-90.6) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | 93.6 | (88.2-96.6) |  | 92.3 | (85.9-95.9) |  |
| Hill Chhetri | 400 | 94.1 | (89.9-96.6) |  | 94.2 | (91.0-96.4) |  |
| Terai Brahmin/Chhetri | 42 | (96.6) | (87.9-99.1) |  | (84.8) | (67.6-93.8) |  |
| Other Terai Caste | 138 | 92.8 | (86.6-96.3) |  | 83.9 | (75.3-89.8) |  |
| Hill Dalit | 271 | 91.2 | (86.5-94.3) | 0.266 | 87.4 | (81.4-91.6) | <0.001 |
| Terai Dalit | 89 | 88.2 | (79.4-93.5) | 0.266 | 89.2 | (79.5-94.6) | <0.001 |
| Newar | 51 | 87.8 | (71.8-95.3) |  | 77.3 | (60.0-88.6) |  |
| Hill Janajati | 385 | 92.6 | (88.3-95.4) |  | 88.3 | (83.4-91.9) |  |
| Terai Janajati | 119 | 85.9 | (75.7-92.3) |  | 74.0 | (62.4-83.0) |  |
| Muslim | 50 | 93.5 | (80.8-98.0) |  | 79.7 | (65.3-89.2) |  |
|  | 1,705 | 92.1 | (90.3-93.5) |  | 87.3 | (85.1-89.2) |  |

[^20]Table 6.3: Participation in the School Health and Nutrition Program among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Participation in School Health and Nutrition Program |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 218 \\ & 227 \\ & 205 \\ & 244 \\ & 244 \end{aligned}$ | $\begin{array}{r} 17.2 \\ 13.8 \\ 24.2 \\ 20.1 \\ 8.3 \end{array}$ | $\begin{array}{r} (11.6-24.7) \\ (8.2-22.2) \\ (18.1-31.4) \\ (13.7-28.4) \\ (4.2-16.0) \\ \hline \end{array}$ | 0.003 |
| Ecological Region Mountain Hill Terai | $\begin{aligned} & 177 \\ & 476 \\ & 485 \end{aligned}$ | $\begin{aligned} & 21.6 \\ & 20.8 \\ & 12.3 \end{aligned}$ | $\begin{array}{r} (15.7-28.9) \\ (15.7-27.2) \\ (8.8-17.0) \end{array}$ | 0.080 |
| Location Urban Rural | $\begin{aligned} & 143 \\ & 995 \end{aligned}$ | $\begin{aligned} & 17.4 \\ & 16.5 \end{aligned}$ | $\begin{array}{r} (9.8-29.0) \\ (13.3-20.2) \\ \hline \end{array}$ | 0.078 |
| $\begin{gathered} \hline \text { Age, years } \\ 6-7 \\ 8-9 \end{gathered}$ | $\begin{aligned} & 528 \\ & 610 \end{aligned}$ | $\begin{aligned} & 16.1 \\ & 17.0 \end{aligned}$ | $\begin{aligned} & (12.8-20.0) \\ & (13.3-21.5) \end{aligned}$ | 0.017 |
| Wealth Quintile Lowest Second Middle Fourth Highest | $\begin{aligned} & 328 \\ & 244 \\ & 200 \\ & 203 \\ & 163 \\ & \hline \end{aligned}$ | $\begin{aligned} & 17.4 \\ & 16.2 \\ & 13.3 \\ & 13.4 \\ & 23.0 \end{aligned}$ | $\begin{array}{r} (12.1-24.4) \\ (11.0-23.1) \\ (9.7-17.9) \\ (8.3-20.8) \\ (13.2-37.2) \\ \hline \end{array}$ | 0.127 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 110 \\ 267 \\ 30 \\ 81 \\ 165 \\ 57 \\ 30 \\ 273 \\ 97 \\ 28 \end{array}$ | 19.7 17.1 $(19.6)$ 9.5 14.1 5.9 $(21.0)$ 22.9 16.7 $(17.8)$ | $\begin{array}{r} (11.5-31.7) \\ (11.8-24.1) \\ (6.2-47.4) \\ (4.5-18.8) \\ (8.8-22.0) \\ (2.0-16.7) \\ (5.8-53.2) \\ (16.2-31.3) \\ (9.6-27.4) \\ (8.9-32.4) \end{array}$ | 0.032 |
| Total | 1,138 | 16.6 | (13.5-20.1) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |

Table 6.4: Participation in the School Health and Nutrition Program among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data
P-value obtained from Pearson's chi-square test.

Table 6.5: Participation in the School Health and Nutrition Program among Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Participation in School Health Program |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 357 \\ & 357 \\ & 353 \\ & 383 \\ & 415 \end{aligned}$ | $\begin{aligned} & 22.4 \\ & 13.5 \\ & 18.5 \\ & 21.6 \\ & 12.4 \end{aligned}$ | $\begin{array}{r} (18.7-26.7) \\ (9.9-18.1) \\ (13.9-24.3) \\ (17.4-26.6) \\ (7.6-19.5) \\ \hline \end{array}$ | <0.001 |
| Ecological Region Mountain Hill Terai | $\begin{aligned} & 291 \\ & 782 \\ & 792 \end{aligned}$ | $\begin{aligned} & 19.0 \\ & 19.0 \\ & 15.9 \end{aligned}$ | $\begin{aligned} & (11.6-29.7) \\ & (16.2-22.2) \\ & (13.1-19.2) \end{aligned}$ | 0.045 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 216 \\ 1,649 \\ \hline \end{array}$ | $\begin{aligned} & 20.6 \\ & 17.2 \\ & \hline \end{aligned}$ | $\begin{aligned} & (12.8-31.4) \\ & (15.1-19.6) \end{aligned}$ | 0.287 |
| $\begin{array}{\|r} \hline \text { Age, years } \\ 10-11 \\ 12-13 \\ 14-15 \\ 16-17 \\ 18-19 \end{array}$ | $\begin{aligned} & 343 \\ & 444 \\ & 404 \\ & 330 \\ & 344 \\ & \hline \end{aligned}$ | $\begin{aligned} & 16.2 \\ & 19.6 \\ & 21.2 \\ & 16.0 \\ & 13.0 \end{aligned}$ | $\begin{aligned} & (13.1-19.8) \\ & (15.4-24.8) \\ & (16.7-26.5) \\ & (12.2-20.9) \\ & (10.0-16.7) \end{aligned}$ | 0.029 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 494 \\ & 429 \\ & 338 \\ & 330 \\ & 274 \end{aligned}$ | $\begin{aligned} & 18.4 \\ & 15.0 \\ & 17.1 \\ & 16.3 \\ & 21.8 \end{aligned}$ | $\begin{aligned} & (15.0-22.3) \\ & (11.8-18.9) \\ & (12.7-22.7) \\ & (11.9-21.8) \\ & (15.7-29.4) \end{aligned}$ | 0.102 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 220 \\ 446 \\ 43 \\ 128 \\ 234 \\ 94 \\ 58 \\ 419 \\ 186 \\ 37 \end{array}$ | 29.0 17.4 $(27.7)$ 16.5 17.2 11.5 2.8 17.4 14.6 $(4.5)$ | $\begin{array}{r} (22.2-36.9) \\ (13.8-21.7) \\ (16.6-42.5) \\ (8.2-30.4) \\ (10.8-26.3) \\ (6.3-20.0) \\ (0.8-9.2) \\ (14.3-20.9) \\ (9.9-20.9) \\ (0.6-27.6) \end{array}$ | <0.001 |
| Total | 1,865 | 17.6 | (15.6-19.8) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |

Table 6.6: Intake of Deworming Tablet in the Past 6 Months among Children 6-9 Years, Nepal National Micronutrient Survey, 2016

| Characteristics | N | $\begin{gathered} \text { Received Tablet from } \\ \text { School } \\ \hline \end{gathered}$ |  |  | Received Tablet from Health Facility |  |  | Received Tablet from OtherPlaces |  |  | No |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 218 | 28.1 | (18.9-39.6) |  | 14.1 | (7.7-24.3) |  | 25.2 | (17.2-35.3) |  | 31.9 | (24.2-40.6) |  |
| Central | 227 | 21.9 | (16.5-28.6) |  | 7.0 | (4.6-10.6) |  | 21.0 | (14.6-29.3) |  | 49.8 | (39.9-59.8) |  |
| Western | 205 | 44.6 | (35.9-53.7) | <0.001 | 3.2 | (1.6-6.2) | 0.085 | 19.8 | (13.7-27.9) | <0.001 | 32.0 | (22.7-42.9) | <0.001 |
| Mid-western | 244 | 33.3 | (27.8-39.3) |  | 8.0 | (4.3-14.3) |  | 38.1 | (29.7-47.3) |  | 20.3 | (15.6-26.0) |  |
| Far-western | 244 | 34.5 | (25.7-44.4) |  | 9.6 | 95.4-16.5) |  | 47.2 | (39.1-55.4) |  | 8.7 | (6.0-12.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 177 | 47.4 | (38.9-56.0) |  | 6.5 | (3.6-11.6) |  | 19.0 | (13.2-26.5) |  | 27.1 | (21.4-33.6) |  |
| Hill | 476 | 40.7 | (35.5-46.0) | $<0.001$ | 6.3 | (4.3-9.3) | 0.623 | 23.8 | (20.1-27.9) | $<0.001$ | 29.1 | (23.5-35.3) | 0.021 |
| Terai | 485 | 19.5 | (14.8-25.2) |  | 9.8 | (6.7-14.1) |  | 30.5 | (24.0-37.8) |  | 39.8 | (32.2-48.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 17.1 | (10.2-27.2) |  | 5.0 | (2.1-11.4) |  | 28.9 | (20.2-39.5) |  | 49.0 | (36.6-61.5) |  |
| Rural | 995 | 31.7 | (27.8-36.0) | 008 | 8.6 | (6.5-11.2) | 0.684 | 26.7 | (22.9-30.8) | 0.000 | 32.6 | (27.7-38.0) | <0.001 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-7 | 528 | 29.7 | (25.5-34.2) |  | 8.1 | (5.4-11.9) | 593 | 27.6 | (23.1-32.6) | 0.731 | 34.4 | (27.8-41.7) |  |
| 8-9 | 610 | 30.5 | (26.2-35.0) |  | 8.2 | (5.8-11.4) |  | 26.2 | (22.0-31.0) | 0.731 | 34.6 | (29.8-39.8) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 557 | 30.5 | (25.7-35.8) |  | 9.8 | (6.7-14.1) |  | 28.6 | (24.0-33.8) |  | 31.1 | (25.5-37.2) |  |
| Female | 576 | 29.9 | (26.1-34.0) | 0.923 | 6.6 | (4.6-9.5) |  | 25.5 | (21.2-30.4) | 0.825 | 37.9 | (32.5-43.7) | 0.394 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 328 | 45.1 | (38.1-52.3) |  | 7.1 | (4.5-11.1) |  | 27.9 | (23.0-32.2) |  | 19.9 | (15.6-25.1) |  |
| Second | 244 | 33.2 | (27.0-40.0) |  | 9.6 | (3.9-21.7) |  | 21.8 | (15.5-29.7) |  | 35.4 | (28.4-43.1) |  |
| Middle | 200 | 28.3 | (20.7-37.4) | $<0.001$ | 9.0 | (5.2-15.3) | 0.302 | 34.7 | (28.2-41.8) | $<0.001$ | 27.4 | (20.6-35.5) | <0.001 |
| Fourth | 203 | 17.5 | (11.2-26.3) |  | 8.5 | (5.1-13.9) |  | 24.1 | (17.3-32.5) |  | 49.4 | (38.5-60.2) |  |
| Highest | 163 | 22.6 | (14.6-33.2) |  | 6.4 | (2.8-14.1) |  | 26.4 | (17.4-37.9) |  | 44.1 | (33.1-55.7) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 25.6 | (18.2-34.7) |  | 13.8 | (8.6-21.4) |  | 38.0 | (28.4-48.5) |  | 21.8 | (13.7-32.8) |  |
| Hill Chhetri | 267 | 38.8 | (31.9-46.2) |  |  | (6.0-13.6) |  | 29.6 | (23.4-36.6) |  | 22.0 | (16.0-29.5) |  |
| Terai Brahmin/Chhetri | 30 | (26.0) | (10.7-50.7) |  | (13.3) | (5.0-30.9) |  | (32.0) | (14.9-55.8) |  | (28.7) | (6.6-69.7) |  |
| Other Terai caste | 81 | 9.9 | (4.4-20.5) |  | 7.1 | (3.5-13.8) |  | 28.0 | (16.4-43.4) |  | 55.0 | (39.0-70.1) |  |
| Hill Dalit | 165 | 38.3 | (29.3-48.1) | <0.001 | 4.6 | (2.2-9.5) |  | 35.3 | (27.2-44.2) | <0.001 | 20.6 | (14.0-29.2) | <0.001 |
| Terai Dalit | 57 | 12.2 | (4.9-27.3) |  | 17.4 | (6.1-40.4) |  | 33.7 | (20.0-50.9) | <0.001 | 36.7 | (23.7-52.0) |  |
| Newar | 30 | (17.3) | (6.4-39.0) |  | (4.6) | (0.7-23.6) |  | (15.3) | (7.6-28.3) |  | (62.9) | (40.9-80.5) |  |
| Hill Janajati | 273 | 47.1 | (40.8-53.5) |  |  | (2.5-9.7) |  | 12.4 | (8.8-17.1) |  | 35.1 | (29.1-41.7) |  |
| Terai Janajati | 97 | 31.9 | (18.9-48.5) |  | 2.8 | (1.1-6.8) |  | 39.0 | (25.3-54.8) |  | 26.3 | (14.8-42.2) |  |
| Muslim | 28 | (11.0) | (4.3-25.3) |  | (10.8) | (1.9-42.5) |  | (23.1) | (8.3-49.7) |  | (55.2) | (43.0-66.8) |  |
| Total | 1,138 | 30.1 | (26.5-33.9) |  |  | (6.2-10.6) |  | 26.9 | (23.1-31.1) |  | 34.5 | (29.8-39.6) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.7: Intake of Deworming Tablet in the Past 6 Months among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Received Tablet from School |  |  | Received Tablet from Other Places |  |  | No |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95 \% CI) | pvalue | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | pvalue |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 208 |  | (14.7-26.4) |  | 35.4 | (27.5-44.2) |  | 44.7 | (34.7-55.1) |  |
| Central | 209 | 16.4 | (12.4-21.5) |  | 20.0 | (15.5-25.5) |  | 63.5 | (57.9-68.8) |  |
| Western | 195 | 33.7 | (29.0-38.8) | 0.002 | 20.2 | (16.0-25.1) | $<0.001$ | 46.1 | (39.6-52.7) | $<0.001$ |
| Mid-western | 199 | 29.5 | (21.4-39.1) |  | 35.7 | (29.3-42.7) |  | 34.8 | (25.1-46.0) |  |
| Far-western | 214 | 29.7 | (22.3-38.4) |  | 55.0 | (47.3-62.4) |  | 15.3 | (11.2-20.6) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 157 | 43.5 | (36.3-50.9) |  | 32.6 | (27.7-37.9) |  | 23.9 | (18.9-29.9) |  |
| Hill | 435 | 30.4 | (26.5-34.5) | $<0.001$ | 28.9 | (26.1-31.9) | 0.159 | 40.7 | (36.3-45.3) | $<0.001$ |
| Terai | 433 | 15.9 | (12.4-20.1) |  | 29.5 | (24.7-34.7) |  | 54.7 | (49.0-60.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 9.1 | (5.0-15.8) | <0.001 | 25.7 | (16.9-37.0) | 0.248 | 65.3 | (54.0-75.0) | 0.001 |
| Rural | 882 | 26.2 | (23.2-29.4) | <0.001 | 30.1 | (27.3-33.0) | 0.248 | 43.8 | (40.0-47.6) | 0.001 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 207 | 26.8 | (21.5-32.8) |  | 31.4 | (25.0-38.5) |  | 41.8 | (34.9-49.1) |  |
| 12-13 | 265 | 31.7 | (26.3-37.7) |  | 23.9 | (19.3-29.3) |  | 44.4 | (38.2-50.7) |  |
| 14-15 | 238 | 29.8 | (24.9-35.2) | $<0.001$ | 35.2 | (29.0-41.9) | 0.279 | 35.0 | (28.2-42.5) | $<0.001$ |
| 16-16 | 165 | 18.8 | (13.6-25.4) |  | 31.5 | (25.1-38.8) |  | 49.7 | (42.3-57.2) |  |
| 18-19 | 150 | 4.9 | (2.6-8.9) |  | 25.4 | (18.7-33.4) |  | 69.8 | (61.7-76.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 252 | 43.6 | (38.0-49.4) |  |  | (27.9-37.2) |  | 24.0 | (18.8-30.1) |  |
| Second | 211 | 26.8 | (21.9-32.3) |  | 28.7 | (24.2-33.7) |  | 44.5 | (37.7-51.5) |  |
| Middle | 209 | 19.5 | (14.8-25.3) | $<0.001$ | 35.7 | (28.7-43.4) | 0.011 | 44.8 | (36.0-53.9) | $<0.001$ |
| Fourth | 165 | 13.7 | (9.6-19.3) |  | 22.4 | (17.2-28.7) |  | 63.8 | (55.7-71.3) |  |
| Highest | 188 | 16.6 | (10.9-24.4) |  | 26.8 | (19.5-35.7) |  | 56.6 | (47.4-65.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 25.2 | (18.5-33.3) |  | 36.9 | (27.7-47.2) |  | 37.9 | (26.3-51.1) |  |
| Hill Chhetri | 267 | 26.2 | (19.7-34.0) |  | 37.6 | (31.1-44.7) |  | 36.1 | (28.1-45.1) |  |
| Terai Brahmin/Chhetri | 32 | (11.6) | (3.7-30.9) |  | (51.4) | (32.6-69.9) |  | (36.9) | (22.0-54.9) |  |
| Other Terai caste | 70 | 13.4 | (7.8-22.2) |  | 31.5 | (20.1-45.7) |  | 55.1 | (42.0-66.7) |  |
| Hill Dalit | 121 | 33.3 | (24.9-43.0) | <0.001 | 29.9 | (21.3-40.3) | <0.001 | 36.8 | (27.3-47.3) | <0.001 |
| Terai Dalit | 38 | (12.2) | (4.3-30.0) | <0.001 | (30.3) | (20.5-42.2) | <0.001 | (57.5) | (39.7-73.6) | <0.001 |
| Newar | 37 | (24.0) | (14.6-36.8) |  | (11.3) | (4.6-25.4) |  | (64.7) | (50.2-77.0) |  |
| Hill Janajati | 211 | 34.8 | (29.3-40.7) |  |  | (13.4-21.3) |  | 48.2 | (41.4-55.1) |  |
| Terai Janajati | 90 | 18.5 | (10.0-31.6) |  |  | (18.1-45.8) |  | 51.4 | (35.8-66.7) |  |
| Muslim | 22 | * | * |  | * | * |  | * | * |  |
| Total | 1,025 | 23.8 | (21.2-26.7) |  | 29.4 | (26.6-32.4) |  | 46.7 | (43.2-50.3) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |

Table 6.8: Intake of Deworming Tablet in the Past 6 Months among Adolescent Girls 10-19 Years, Nepal National Micronutrient Survey, 2016


[^21]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data.
P -value obtained from Pearson's chi-square test.

Table 6.9: Iron and Folic Acid Supplement Intake Yesterday among Reproductive Age Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathbf{N a}^{\text {a }}$ | Iron and Folic Acid Supplement Intake Yesterday |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 472 \\ & 473 \\ & 465 \\ & 475 \\ & 466 \end{aligned}$ | 7.1 5.0 4.0 5.7 4.5 | $\begin{array}{r} (4.6-10.9) \\ (3.1-8.0) \\ (2.1-7.2) \\ (4.3-7.7) \\ (3.0-6.9) \end{array}$ | 0.257 |
| Ecological Region Mountain Hill Terai | $\begin{aligned} & 381 \\ & 984 \\ & 986 \end{aligned}$ | 4.7 5.0 5.7 |  | 0.691 |
| $\begin{array}{\|c} \hline \text { Location } \\ \text { Urban } \\ \text { Rural } \end{array}$ | 322 2,029 | 5.4 5.3 | $\begin{aligned} & (3.1-9.1) \\ & (4.1-6.9) \\ & \hline \end{aligned}$ | 0.975 |
| Age, years <br> $15-19$ <br> $20-29$ <br> $30-39$ <br> $40-49$ | $\begin{array}{r} 273 \\ 1,003 \\ 696 \\ 379 \\ \hline \end{array}$ | 11.2 7.6 2.5 0.7 | $\begin{array}{r} (7.7-16.0) \\ (5.7-10.2) \\ (1.6-3.9) \\ (0.5-1.1) \\ \hline \end{array}$ | <0.001 |
| Education <br> No education ${ }^{\text {a }}$ <br> Primary ${ }^{\text {b }}$ <br> Some secondary ${ }^{\text {c }}$ <br> SLC and above ${ }^{\text {d }}$ | $\begin{aligned} & 756 \\ & 406 \\ & 614 \\ & 575 \end{aligned}$ | 2.4 6.4 5.3 8.1 | $\begin{array}{r} (1.6-3.6) \\ (4.4-9.2) \\ (3.6-7.7) \\ (5.8-11.1) \\ \hline \end{array}$ | <0.001 |
| Pregnancy Status <br> Pregnant <br> Non-pregnant | $\begin{array}{r} 207 \\ 2,144 \\ \hline \end{array}$ | $\begin{array}{r} 51.2 \\ 0.9 \\ \hline \end{array}$ | $\begin{array}{r} (44.8-57.6) \\ (0.6-1.4) \end{array}$ | <0.001 |
| Trimester of Pregnancy (among pregnant women) <br> First trimester <br> Second trimester <br> Third trimester | 57 75 75 | $\begin{array}{r} 7.0 \\ 64.1 \\ 69.2 \end{array}$ | $\begin{array}{r} (2.4-18.7) \\ (53.7-73.4) \\ (58.2-78.4) \end{array}$ | <0.001 |
| Lactating Status (among those who gave birth in the last 5 years) Yes <br> No | 595 235 | 1.7 1.1 | $\begin{aligned} & (1.0-3.0) \\ & (0.3-4.8) \end{aligned}$ | 0.560 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 531 \\ & 491 \\ & 456 \\ & 454 \\ & 419 \end{aligned}$ | 5.0 4.8 5.0 6.9 4.9 | $\begin{array}{r} (3.8-6.7) \\ (3.3-6.9) \\ (3.0-8.4) \\ (4.6-10.1) \\ (2.9-8.0) \end{array}$ | 0.590 |
| Ethnicity <br> Hill Brahmin Hill Chhetri Terai Brahmin/Chhetri Other Terai Caste Hill Dalit Terai Dalit Newar Hill Janajati Terai Janajati Muslim | $\begin{array}{r} 297 \\ 565 \\ 64 \\ 156 \\ 295 \\ 106 \\ 80 \\ 528 \\ 210 \\ 48 \\ \hline \end{array}$ | 5.4 6.7 3.0 5.9 5.5 4.2 4.9 4.7 3.1 $(14.3)$ | $\begin{array}{r} (2.9-9.7) \\ (5.0-9.1) \\ (0.9-9.2) \\ (3.6-9.6) \\ (3.5-8.6) \\ (0.9-17.6) \\ (2.6-9.1) \\ (2.6-8.4) \\ (1.3-7.1) \\ (6.8-27.8) \\ \hline \end{array}$ | 0.165 |
| Total | 2,351 | 5.3 | (4.2-6.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Includes those who have never attended school. <br> ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. <br> ${ }^{\text {'I Includes those who have completed 6-9 years of school. }}$ <br> ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |

Table 6.10: Iron and Folic Acid Supplement Intake and Deworming in the Last 6 Months among Reproductive Age Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Any Deworming during last 6 months |  |  | Any Iron and Folic Acid Supplement Intake during last 6 months |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  | <0.001 |  |  | 0.026 |
| Eastern | 472 | 44.5 | (37.5-51.7) |  | 7.8 | (4.9-12.1) |  |
| Central | 473 | 23.0 | (18.5-28.3) |  | 5.8 | (3.8-8.8) |  |
| Western | 465 | 33.3 | (28.0-39.1) |  | 3.8 | (2.3-6.1) |  |
| Mid-western | 475 | 61.5 | (55.5-67.2) |  | 8.9 | (6.1-12.8) |  |
| Far-western | 466 | 75.3 | (70.3-79.8) |  | 6.0 | (4.0-8.8) |  |
| Ecological Region |  |  |  | <0.001 |  |  | 0.891 |
| Mountain | 381 | 48.1 | (42.0-54.2) |  | 6.9 | (4.6-10.3) |  |
| Hill | 984 | 43.3 | (39.7-46.9) |  | 6.4 | (5.0-8.3) |  |
| Terai | 986 | 35.9 | (31.8-40.2) |  | 6.1 | (4.3-8.7) |  |
| Location |  |  |  | 0.001 |  |  | 0.623 |
| Urban | 322 | 31.3 | (25.5-37.8) |  | 6.9 | (4.3-10.7) |  |
| Rural | 2,029 | 41.1 | (38.1-44.1) |  | 6.2 | (4.9-7.9) |  |
| Age, years |  |  |  |  |  |  | <0.001 |
| 15-19 | 273 | 55.7 | (48.9-62.3) | $<0.001$ | 10.9 | (7.3-15.9) |  |
| 20-29 | 1,003 | 39.6 | (36.5-42.7) |  | 7.9 | (6.3-9.7) |  |
| 30-39 | 696 | 38.8 | (34.2-43.6) |  | 4.2 | (2.9-6.1) |  |
| 40-49 | 379 | 31.8 | (26.6-37.6) |  | 3.0 | (1.5-6.0) |  |
| Education |  |  |  |  |  |  | <0.001 |
| No education ${ }^{\text {b }}$ | 756 | 33.5 | (30.4-36.7) | <0.001 | 2.8 | (1.8-4.4) |  |
| Primary ${ }^{\text {c }}$ | 406 | 32.4 | (28.2-36.9) |  | 6.0 | (4.2-8.6) |  |
| Some secondary ${ }^{\text {d }}$ | 614 | 47.3 | (42.3-52.5) |  | 5.2 | (3.5-7.7) |  |
| SLC and above ${ }^{\text {e }}$ | 575 | 44.3 | (39.5-49.3) |  | 11.6 | (8.4-15.6) |  |
| Literate ${ }^{\text {a }}$ |  |  |  |  |  |  | 0.167 |
| Able to read entire sentence | 304 | 29.6 | (24.8-35.0) | 0.004 | 6.1 | (3.9-9.6) |  |
| Read part of sentence | 308 | 42.4 | (36.0-49.0) |  | 2.5 | (1.3-4.8) |  |
| Cannot read any of sentence | 546 | 30.5 | (26.7-34.6) |  | 3.5 | (2.3-5.3) |  |
| Pregnancy Status |  |  |  | 0.030 |  |  | <0.001 |
| Pregnant | 207 | 46.8 | (41.4-52.3) |  | 27.8 | (21.6-34.9) |  |
| Non-pregnant | 2,144 | 39.1 | (36.4-42.0) |  | 4.2 | (3.3-5.4) |  |
| Trimester of Pregnancy |  |  |  | <0.001 |  |  | <0.001 |
| (among pregnant women) |  |  |  |  |  |  |  |
| First trimester | 57 | 23.1 | (13.1-37.4) |  | 1.6 | (0.2-10.6) |  |
| Second trimester | 75 | 51.4 | (42.8-60.0) |  | 35.9 | (23.0-51.1) |  |
| Third trimester | 75 | 58.8 | (48.5-68.4) |  | 37.9 | (28.5-48.3) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  | 0.521 |  |  | 0.048 |
| Yes | 595 | 40.8 | (37.2-44.5) |  | 7.4 | (5.7-9.6) |  |
| No | 235 | 38.3 | (31.1-46.2) |  | 3.7 | (1.8-7.8) |  |
| Wealth Quintile |  |  |  |  |  |  | 0.003 |
| Lowest | 531 | 52.8 | (47.7-57.8) | <0.001 | 5.6 | (4.1-7.5) |  |
| Second | 491 | 40.7 | (36.0-45.6) |  | 5.1 | (3.4-7.5) |  |
| Middle | 456 | 41.4 | (55.2-47.8) |  | 3.4 | (2.1-5.5) |  |
| Fourth | 454 | 35.5 | (29.6-41.8) |  | 8.5 | (6.0-11.9) |  |
| Highest | 419 | 33.2 | (27.5-39.4) |  | 8.3 | (5.3-12.7) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 297 | 46.1 | (39.7-52.6) | <0.001 | 6.1 | (3.5-10.5) | 0.014 |
| Hill Chhetri | 565 | 50.2 | (45.2-55.2) |  | 9.2 | (6.3-13.3) |  |
| Terai Brahmin/Chhetri | 64 | 40.1 | (29.4-51.8) |  | 8.8 | (3.7-19.4) |  |
| Other Terai Caste | 156 | 20.7 | (15.4-267.3) |  | 4.7 | (2.0-10.5) |  |
| Hill Dalit | 295 | 48.2 | (41.3-55.3) |  | 4.8 | (3.1-7.5) |  |
| Terai Dalit | 106 | 38.9 | (24.0-56.1) |  | 3.9 | (1.2-11.5) |  |
| Newar | 80 | 25.5 | (15.5-39.0) |  | 6.2 | (3.2-11.9) |  |
| Hill Janajati | 528 | 31.3 | (26.7-36.3) |  | 4.6 | (3.4-6.2) |  |
| Terai Janajati | 210 | 53.3 | (45.0-61.4) |  | 6.8 | (4.1-11.1) |  |
| Muslim | 48 | (30.0) | (21.4-40.3) |  | (15.0) | (5.1-37.1) |  |
| Total | 2,351 | 39.8 | (37.1-42.5) |  | 6.3 | (5.1-7.8) |  |

[^22]Table 6.11: During Last Pregnancy Iron and Folic Acid Supplement Tablets Consumed Among Women of Reproductive Age 15-49 Years Who Gave Birth in the Last 5 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Consumed any iron and folic acid tablets during last pregnancy |  |  |  | $\mathrm{Na}^{\text {a }}$ | Median number of iron and folic acid tablets consumed ${ }^{\text {a }}$ |  | Location Where Obtain Iron and Folic Acid Supplements ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Received from FCHV |  |  | Received from health center |  |  | Received from pharmacy |  |  |
|  | N | \% | (95\% CI) | p-value |  | Median | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 182 | 92.9 | (88.7-95.6) |  |  | 162 | 180.0 | 53.1 | 14.0 | (8.6-21.9) |  | 73.4 | (64.5-80.7) |  | 15.3 | (9.8-23.1) |  |
| Central | 193 | 90.5 | (85.2-94.1) |  | 175 | 180.0 | 48.8 | 12.1 | (7.9-18.3) |  | 70.5 | (62.6-77.3) |  | 19.5 | (13.9-26.8) |  |
| Western | 162 | 89.3 | (83.2-93.3) | 0.313 | 144 | 180.0 | 52.9 | 30.0 | (22.1-39.3) | <0.001 | 72.2 | (63.2-79.7) | 0.008 | 5.2 | (2.5-10.5) | <0.001 |
| Mid-western | 199 | 87.7 | (82.0-91.7) |  | 175 | 180.0 | 44.9 | 45.6 | (37.9-53.4) |  | 54.4 | (46.6-62.0) |  | 6.6 | (3.6-12.1) |  |
| Far-western | 207 | 94.5 | (90.5-96.9) |  | 195 | 180.0 | 37.4 | 39.4 | (32.5-46.8) |  | 68.3 | (61.1-74.7) |  | 4.3 | (2.3-7.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 167 | 90.0 | (83.9-94.0) |  | 152 | 180.0 | 56.7 | 33.2 | (25.4-42.0) |  | 73.0 | (64.5-80.1) |  | 3.7 | (1.5-8.7) |  |
| Hill | 421 | 91.5 | (87.8-94.1) | 0.837 | 384 | 180.0 | 47.4 | 24.0 | (19.6-28.9) | 0.101 | 73.2 | (67.8-78.0) | 0.025 | 8.3 | (5.3-12.6) | <0.001 |
| Terai | 355 | 90.4 | (86.7-93.1) |  | 315 | 180.0 | 49.3 | 20.7 | (16.2-26.1) |  | 64.3 | (58.0-70.1) |  | 18.5 | (13.9-24.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 111 | 96.7 | (89.4-99.1) | 0.026 | 107 | 180.0 | 42.9 | 7.3 | (3.8-13.4) | $<0.001$ | 72.9 | (61.4-82.0) | 0.376 | 20.7 | (12.6-32.0) | 0.011 |
| Rural | 832 | 90.1 | (87.6-92.2) | 0.026 | 744 | 180.0 | 49.7 | 25.2 | (21.8-29.0) | <0.001 | 68.5 | (64.3-72.4) | 0.376 | 11.7 | (8.9-15.1) |  |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 35 | (91.5) | (68.4-98.2) |  | 33 | (180.0) | (56.5) | (27.0) | (13.8-46.1) |  | (62.2) | (41.2-79.4) |  | (17.4) | (5.9-41.7) |  |
| 20-29 | 645 | 94.2 | (91.8-95.9) | $<0.001$ | 604 | 180.0 | 49.3 | 21.7 | (18.2-25.6) | 0.290 | 70.2 | (65.7-74.4) | 0.224 | 13.2 | (10.1-17.1) | 0.595 |
| 30-39 | 230 | 82.7 | (76.2-87.6) | <0.001 | 189 | 180.0 | 46.0 | 25.7 | (19.1-33.8) | 0.290 | 68.1 | (59.5-75.7) | 0.224 | 10.1 | (5.6-17.5) | 0.595 |
| 40-49 | 33 | (75.5) | (54.8-88.7) |  | 25 | (180.0) | (54.7) | (37.2) | (17.3-62.6) |  | (49.6) | (25.6-73.8) |  | (13.2) | (2.0-53.7) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 262 | 79.0 | (73.8-83.4) |  | 210 | 180.0 | 50.3 | 32.8 | (24.2-42.7) |  | 63.7 | (54.6-71.9) |  | 7.6 | (3.8-14.9) |  |
| Primary ${ }^{\text {e }}$ | 171 | 92.8 | (87.7-95.8) | . 001 | 155 | 180.0 | 60.1 | 26.4 | (19.9-34.0) | <0.001 | 73.9 | (66.4-80.2) | 0.179 | 8.4 | (4.5-15.1) | <0.001 |
| Some secondary ${ }^{\text {f }}$ | 255 | 93.9 | (90.5-96.2) | . 001 | 238 | 180.0 | 47.6 | 22.8 | (18.1-28.3) | <0.001 | 71.7 | (65.2-77.4) | 0.179 | 9.7 | (6.3-14.7) | <0.001 |
| SLC and above ${ }^{\text {g }}$ | 255 | 97.3 | (94.3-98.7) |  | 248 | 180.0 | 41.1 | 14.8 | (10.8-20.0) |  | 67.7 | (60.0-74.6) |  | 21.3 | (16.2-27.5) |  |
| Literate ${ }^{\text {c }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Able to read entire sentence | 109 | 94.5 | (88.3-97.5) |  | 102 | 180.0 | 65.4 | 27.9 | (19.3-38.6) |  | 69.6 | (57.9-79.2) |  | 11.4 | (5.2-23.2) |  |
| Read part of sentence | 119 | 87.9 | (80.3-92.8) | 0.001 | 103 | 180.0 | 42.2 | 34.2 | (24.8-45.0) | 0.574 | 71.6 | (61.4-80.0) | 0.729 | 2.5 | (0.5-12.0) | 0.020 |
| Cannot read any of sentence | 203 | 77.2 | (69.6-83.4) |  | 158 | 180.0 | 52.7 | 29.4 | (21.4-38.9) |  | 65.3 | (55.3-74.1) |  | 8.3 | (3.8-17.3) |  |
| Pregnancy Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 113 | 86.9 | (77.6-92.7) | 0.126 | 99 | 180.0 | 47.3 | 21.4 | (14.5-30.4) | 0.639 | 68.8 | (57.6-78.1) | 0.996 | 13.0 | (6.0-25.7) | 0.923 |
| Non-pregnant | 830 | 91.4 | (89.1-93.3) | 0.126 | 752 | 180.0 | 49.2 | 23.4 | (19.6-27.5) | 0.639 | 69.0 | (64.5-73.2) | 0.996 | 12.7 | (10.5-15.3) | 0.923 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First trimester | 32 | (95.9) | (83.7-99.1) |  | 30 | (180.0) | (47.8) | (38.3) | (20.7-59.5) |  | (70.8) | (49.4-85.8) |  | (0.0) | - |  |
| Second trimester | 42 | (83.6) | (65.7-93.1) | 0.171 | 36 | (180.0) | (56.2) | (12.7) | (4.9-29.2) | 0.023 | (67.2) | (47.0-82.6) | 0.947 | (22.0) | (9.4-43.3) | 0.027 |
| Third trimester | 39 | (83.1) | (63.0-93.4) |  | 33 | (180.0) | (32.9) | (15.2) | (7.1-29.4) |  | (68.5) | (48.8-83.3) |  | (15.1) | (5.1-37.3) |  |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 595 | 92.8 | (90.1-94.9) |  | 549 | 180.0 | 49.2 | 24.0 | (20.4-28.0) |  |  | (64.7-74.6) |  | 11.1 | (7.9-15.5) |  |
| No | 235 | 88.1 | (84.4-91.0) |  | 203 | 180.0 | 49.2 | 21.8 | (14.3-31.7) |  |  | (56.8-75.6) | 0.420 | 16.4 | (10.8-24.2 | 0.051 |

Table 6.11: Cont'd.

| Characteristics | Consumed any iron and folic acid tablets during last pregnancy |  |  |  | $\mathbf{N a}^{\text {a }}$ | Median number of iron and folic acid tablets consumed ${ }^{\text {a }}$ |  | Location Where Obtain Iron and Folic Acid Supplements ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Received from FCHV |  |  | Received from health center |  |  | Received from pharmacy |  |  |
|  | N |  | (95\% CI) | p-value |  | Median | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 275 | 81.8 | (75.5-86.7) |  |  | 232 | 180.0 | 48.1 | 40.1 | (33.0-47.6) |  |  | (59.9-73.7) |  | 2.7 | (0.9-8.0) |  |
| Second | 202 | 85.2 | (78.1-90.3) |  | 176 | 180.0 | 51.7 | 36.6 | (28.4-45.7) |  |  | (54.7-72.0) |  | 4.9 | (2.0-11.7) |  |
| Middle | 160 | 93.3 | (87.6-96.4) | <0.001 | 147 | 180.0 | 46.6 | 20.4 | (14.0-28.9) | <0.001 |  | (62.5-79.8) | 0.534 | 12.3 | (7.0-20.6) | <0.001 |
| Fourth | 173 | 96.4 | (92.0-98.4) |  | 166 | 180.0 | 54.8 | 14.3 | (9.5-21.2) |  |  | (62.1-78.0) |  | 15.8 | (10.4-23.4) |  |
| Highest | 133 | 98.1 | (93.2-99.5) |  | 130 | 180.0 | 41.5 | 7.1 | (3.7-13.2) |  | 70.7 | (60.6-79.2) |  | 26.5 | (18.4-36.5) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 100 | 98.1 | (92.5-99.5) |  | 98 | 180.0 | 34.3 | 22.9 | (14.8-33.7) |  |  | (52.8-75.1) |  | 19.2 | (11.1-31.0) |  |
| Hill Chhetri | 248 | 91.9 | (86.9-95.1) |  | 228 | 180.0 | 32.4 | 33.8 | (26.9-41.4) |  |  | (54.1-69.8) |  | 11.1 | (6.7-18.0) |  |
| Terai Brahmin/Chhetri | 24 |  |  |  | 24 | * | * | * | * |  | * |  |  | * | * |  |
| Other Terai Caste | 64 | 82.1 | (70.5-89.7) |  | 51 | 180.0 | 55.7 | 22.0 | (12.6-35.5) |  |  | (40.0-68.4) |  | 25.6 | (14.7-40.7) |  |
| Hill Dalit | 146 | 92.1 | (86.0-95.6) |  | 133 | 180.0 | 54.4 | 29.0 | (20.9-38.8) |  |  | (64.6-81.5) |  | 2.8 | (1.1-6.8) |  |
| Terai Dalit | 39 | (89.9) | (75.3-96.3) |  | 35 | (180.0) | (40.3) | (19.3) | (8.2-39.2) | 0.001 | (83.8) | (64.8-93.6) | <0.001 | (1.2) | (0.2-8.0) | <0.001 |
| Newar | 31 | (93.7) | (75.2-98.7) |  | 29 | (180.0) | (57.8) | (6.2) | (1.4-24.3) |  | (83.5) | (60.9-94.2) |  | (16.5) | (5.8-39.1) |  |
| Hill Janajati | 207 | 89.0 | (83.1-93.0) |  | 180 | 180.0 | 58.5 | 17.6 | (12.1-25.0) |  |  | (72.2-85.8) |  | 5.7 | (2.8-11.2) |  |
| Terai Janajati | 60 | 90.8 | (81.9-95.6) |  | 52 | 180.0 | 46.6 | 17.5 | (9.2-30.7) |  |  | (51.1-80.2) |  | 17.6 | (8.0-34.5) |  |
| Muslim | 23 | * | - |  | 20 | * | * | * | * |  | * | * |  | * | * |  |
| Total | 943 | 90.8 | (88.5-92.7) |  | 851 | 180.0 | 49.0 | 23.1 | (20.1-26.5) |  | 69.0 | (65.1-72.6) |  | 12.7 | (10.1-16) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who consumed any iron and folic acid tablets during pregnancy in the last 5 years. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Multiple options possible. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c }}$ Those with less than a $5^{\text {dh }}$ year completed education asked to read a sentence on a card. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{8}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| Characteristics | $\mathrm{Na}^{\text {a }}$ | Number of tablets consumed ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 180 or more |  |  | 120-179 |  |  | 60-119 |  |  | 1-59 |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 162 | 76.2 | (67.8-83.0) |  | 6.7 | (3.0-14.4) |  | 7.2 | (4.1-12.2) |  | 9.9 | (5.8-16.5) |  |
| Central | 175 | 78.8 | (71.6-84.6) |  | 6.2 | (3.2-11.6) |  | 7.4 | (4.2-12.8) |  | 7.6 | (4.4-12.8) |  |
| Western | 144 | 68.9 | (59.0-77.4) | 0.011 | 11.4 | (6.4-19.5) | 0.103 | 11.3 | (6.1-20.0) | 0.228 | 8.3 | (4.2-16.0) | 0.354 |
| Mid-western | 175 | 76.0 | (68.9-81.9) |  | 7.6 | (4.5-12.6) |  | 11.6 | (7.5-17.7) |  | 4.8 | (2.6-8.7) |  |
| Far-western | 195 | 88.8 | (83.1-92.7) |  | 2.6 | (1.0-6.9) |  | 4.1 | (2.0-8.2) |  | 4.5 | (2.2-8.8) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 152 | 78.1 | (69.9-84.5) |  | 2.3 | (0.7-7.1) |  | 7.8 | (4.2-13.9) |  | 11.9 | (7.3-19.0) |  |
| Hill | 384 | 78.4 | (72.9-83.0) | 0.672 | 6.3 | (3.8-10.3) | 0.119 | 9.3 | (6.4-13.4) | 0.560 | 5.9 | (3.6-9.6) | 0.212 |
| Terai | 315 | 76.0 | (70.1-81.1) |  | 8.4 | (5.4-12.9) |  | 7.3 | (4.6-11.3) |  | 8.3 | (5.4-12.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 107 | 84.9 | (76.3-90.8) | 0.048 | 3.3 | (1.2-8.8) |  | 6.4 | (3.3-12.1) |  | 5.3 | (2.0-13.4) |  |
| Rural | 744 | 76.2 | (72.2-79.8) | 0.048 | 7.5 | (5.4-10.4) | 0.116 | 8.5 | (6.3-11.3) | 0.463 | 7.8 | (5.7-10.5) | 0.374 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 33 | (71.7) | (51.6-85.8) |  | (5.3) | (1.6-16.1) |  | (11.9) | (3.5-33.2) |  | (11.1) | (3.6-29.4) |  |
| 20-29 | 604 | 78.7 | (74.4-82.5) |  | 7.5 | (5.1-10.7) |  | 6.0 | $(4.1-8.6)$ |  | 7.9 | (5.6-11.0) |  |
| 30-39 | 189 | 73.4 | (64.8-80.5) | . 439 | 6.6 | (3.2-13) | 0.647 | 15.0 | (9.5-22.8) | 0.002 | 5.1 | (2.5-10.0) | 0.435 |
| 40-49 | 25 | (77.6) | (49.2-92.6) |  | (0.0) | (32-1) |  | (11.3) | (3.4-31.3) |  | (11.1) | (1.6-48.8) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 210 | 73.5 | (67.2-78.9) |  | 6.8 | (3.6-12.5) |  | 11.9 | (8.2-16.9) |  | 7.8 | (5.0-12.1) |  |
| Primary ${ }^{\text {d }}$ | 155 | 72.5 | (63.2-80.2) |  | 5.2 | (2.6-10.1) |  | 8.9 | (5.0-15.3) |  | 13.4 | (8.0-21.8) |  |
| Some secondary ${ }^{\text {e }}$ | 238 | 77.7 | (71.1-83.1) | 0.080 | 7.5 | (4.3-12.7) | 0.805 | 8.2 | (5.2-12.6) | 0.105 | 6.7 | (3.9-11.2) | 0.018 |
| SLC and above ${ }^{\text {f }}$ | 248 | 82.0 | (74.2-87.8) |  | 7.7 | (4.0-14.3) |  | 5.4 | (3.1-9.3) |  | 4.9 | (2.2-10.3) |  |
| Literate ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Able to read entire sentence | 102 | 66.4 | (54.7-76.5) |  | 4.5 | (1.5-12.8) |  | 11.8 | (6.6-20.4) |  | 17.2 | (9.6-28.9) |  |
| Read part of sentence | 103 | 80.7 | (70.3-88.1) | 0.124 | 7.8 | (3.6-15.9) | 0.740 | 6.5 | (2.9-14.0) | 0.423 | 5.1 | (1.6-14.5) | 0.034 |
| Cannot read any of sentence | 158 | 72.4 | (62.5-80.5) |  | 6.3 | (2.7-13.8) |  | 12.3 | (7.0-20.8) |  | 9.0 | (4.6-16.7) |  |
| Pregnancy Status |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 99 | 83.6 | (75.0-89.6) | 0.097 | 2.8 | (0.8-9.3) | 0.090 | 6.3 | (2.6-14.2) | 0.396 | 7.3 | (4.2-12.4) | 0.858 |
| Non-pregnant | 752 | 76.4 | (72.8-79.6) | 0.097 | 7.6 | (5.4-10.6) | 0.090 | 8.5 | (6.8-10.7) | 0.396 | 7.5 | (5.5-10.2) | 0.858 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First trimester | 30 | (78.1) | (55.9-90.9) |  | (7.0) | (1.5-26.4) |  | (5.8) | (0.8-32.2) |  | (9.1) | (2.3-29.9) |  |
| Second trimester | 36 | (81.4) | (62.5-92.0) | 0.350 | (1.7) | (0.2-11.8) | 0.325 | (4.9) | (1.4-15.4) | 0.790 | (12.0) | (3.6-33) | 0.177 |
| Third trimester | 33 | (91.5) | (73.1-97.7) |  | (0.0) | (0.11.8) |  | (8.5) | (2.3-26.9) |  | (0.0) | (36-33) |  |

Table 6.12: Cont'd...


[^23]Table 6.13: During Last Pregnancy, Deworming Intake Among Women of Reproductive Age 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Deworming tablet intake during last pregnancy |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 182 | 55.9 | (47.4-64.0) |  |
| Central | 193 | 53.7 | (46.1-61.2) |  |
| Western | 162 | 55.3 | (46.3-63.9) | $<0.001$ |
| Mid-western | 199 | 69.9 | (62.7-76.1) |  |
| Far-western | 207 | 75.5 | (69.0-81.0) |  |
| Ecological Region |  |  |  |  |
| Mountain | 167 | 75.7 | (67.6-82.4) |  |
| Hill | 421 | 60.2 | (54.4-65.8) | 0.005 |
| Terai | 355 | 55.1 | (49.2-60.9) |  |
| Location |  |  |  |  |
| Urban | 111 | 53.7 | (42.5-64.6) | 243 |
| Rural | 832 | 59.6 | (55.5-63.7) | 243 |
| Age, years |  |  |  |  |
| 15-19 | 35 | (67.0) | (46.5-82.6) |  |
| 20-29 | 645 | 60.4 | (55.6-64.9) | 0.300 |
| 30-39 | 230 | 54.5 | (46.6-62.1) | , 300 |
| 40-49 | 33 | (50.9) | (30.2-71.4) |  |
| Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 262 | 48.6 | (42.8-54.4) |  |
| Primary ${ }^{\text {c }}$ | 171 | 59.5 | (51.167.3) | <0.001 |
| Some secondary ${ }^{\text {d }}$ | 255 | 58.8 | (51.7-65.6) | <0.001 |
| SLC and above ${ }^{\text {e }}$ | 255 | 67.9 | (60.3-74.6) |  |
| Literate ${ }^{\text {a }}$ |  |  |  |  |
| Able to read entire sentence | 109 | 59.1 | (47.7-69.6) |  |
| Read part of sentence | 119 | 66.9 | (56.4-75.9) | <0.001 |
| Cannot read any of sentence | 203 | 42.1 | (34.1-50.6) |  |
| Pregnancy Status |  |  |  |  |
| Pregnant | 113 | 61.1 | (52.7-68.9) | 659 |
| Non-pregnant | 830 | 58.7 | (54.6-62.7) | . 659 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |
| First trimester | 32 | (75.0) | (56.1-87.6) |  |
| Second trimester | 42 | (50.2) | (33.4-67.0) | 0.086 |
| Third trimester | 39 | (62.1) | (42.5-78.5) |  |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  |  |
|  |  |  |  |  |  |
|  | 235 | 55.2 | (47.4-62.9) | 0.215 |
| Wealth Quintile |  |  |  |  |
| Lowest | 275 | 60.6 | (53.3-67.5) |  |
| Second | 202 | 56.0 | (47.5-64.1) |  |
| Middle | 160 | 63.9 | (54.8-72.2) | 0.508 |
| Fourth | 173 | 56.1 | (47.3-64.6) |  |
| Highest | 133 | 58.6 | (48.4-68.1) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 100 | 61.6 | (49.7-72.2) |  |
| Hill Chhetri | 248 | 68.2 | (59.8-75.5) |  |
| Terai Brahmin/Chhetri | 24 | * | * |  |
| Other Terai Caste | 64 | 44.0 | (31.7-57.1) |  |
| Hill Dalit | 146 | 64.9 | (55.1-73.6) | 0.004 |
| Terai Dalit | 39 | (57.1) | (40.2-72.4) | 0.004 |
| Newar | 31 | (47.5) | (28.8-67.0) |  |
| Hill Janajati | 207 | 56.4 | (48.1-64.4) |  |
| Terai Janajati | 60 | 63.6 | (48.5-76.4) |  |
| Muslim | 23 | * | * |  |
| Total | 943 | 59.0 | (55.1-62.8) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |
| ${ }^{\text {a }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card. |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |
|  |  |  |  |  |
| ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |
|  |  |  |  |  |  |


| Characteristics | Consumed Any Iron and Folic Acid Supplements After Last Delivery |  |  |  | $\mathbf{N}^{\text {c }}$ | Sources of Iron and Folic Acid Supplements ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Received from FCHV | Received from health center |  |  | Received from pharmacy |  |  |
|  | $\mathbf{N}^{\text {a }}$ | \% | (95\% CI) | p-value |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 182 | 51.4 | (43.0-59.6) |  |  | 89 | 19.6 | (11.7-30.9) |  | 63.8 | (51.6-74.5) |  | 18.8 | (10.8-30.7) |  |
| Central | 193 | 52.8 | (45.2-60.3) |  | 109 | 9.3 | (4.8-17.4) |  | 69.1 | (58.4-78.1) |  | 19.3 | (12.0-29.5) |  |
| Western | 162 | 61.4 | (52.5-69.5) | 0.011 | 99 | 27.2 | (18.2-38.6) | $<0.001$ | 73.0 | (62.1-81.8) | 0.001 | 4.3 | (1.9-9.6) | $<0.001$ |
| Mid-western | 199 | 62.4 | (55.2-69.2) |  | 122 | 47.9 | (38.8-57.2) |  | 45.1 | (36.2-54.4) |  | 8.6 | (4.6-15.6) |  |
| Far-western | 207 | 68.9 | (61.9-75.1) |  | 144 | 34.0 | (26.4-42.5) |  | 64.5 | (56.0-72.1) |  | 3.2 | (1.3-7.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 167 | 63.8 | (55.3-71.4) |  | 108 | 29.3 | (20.5-39.8) |  | 67.1 | (56.5-76.2) |  | 2.8 | (0.9-8.0) |  |
| Hill | 421 | 64.5 | (58.8-69.8) | $<0.001$ | 274 | 26.6 | (21.2-32.8) | 0.108 | 66.7 | (59.8-72.9) | 0.421 | 8.1 | (4.6-13.8) | <0.001 |
| Terai | 355 | 48.8 | (43.0-54.7) |  | 181 | 19.0 | (13.4-26.3) |  | 61.3 | (52.8-69.1) |  | 20.6 | (14.3-28.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 111 | 76.5 | (66.1-84.5) | $<0.001$ | 83 | 4.5 | (1.7-11.2) | <0.001 | 76.4 | (62.8-86.2) | 0.019 | 16.2 | (8.0-30) | 0.368 |
| Rural | 832 | 54.6 | (50.5-58.7) | <0.001 | 480 | 27.1 | (22.7-31.9) | <0.001 | 62.5 | (57.1-67.6) | 0.019 | 12.1 | (8.6-16.7) | 0.368 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 35 | (37.6) | (21.4-57.1) |  | 17 | * | * |  | * | * |  | * | * |  |
| 20-29 | 645 | 59.5 | (54.8-64.0) | 0.031 | 407 | 23.6 | (19.2-28.6) | 0.981 | 63.5 | (57.6-69.1) | 0.485 | 13.5 | (9.6-18.8) | 0.280 |
| 30-39 | 230 | 54.5 | (46.7-62.0) | 0.031 | 123 | 24.2 | (16.5-34.1) | 0.981 | 68.3 | (57.7-77.2) | 0.485 | 9.8 | (4.7-19.3) | 0.280 |
| 40-49 | 33 | (45.8) | (25.8-67.1) |  | 16 | * | * |  | * | * |  | * | * |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 262 | 34.3 | (28.2-41.0) |  | 117 | 32.1 | (25-1-40.1) |  | 57.5 | (38.3-66.2) |  | 4.8 | (2.7-8.1) |  |
| Primary ${ }^{\text {f }}$ | 171 | 53.8 | (44.7-62.8) | $<0.001$ | 92 | 32.0 | (24.0-41.3) | <0.001 | 58.2 | (48.2-67.5) | 0.452 | 6.5 | (2.4-16.8) | <0.001 |
| Some secondary ${ }^{\text {g }}$ | 255 | 60.0 | (55.0-64.8) | <0.001 | 158 | 21.6 | (15.6-29.1) | <0.001 | 66.5 | (56.7-73.3) | 0.452 | 9.8 | (5.4-17.1) | <0.001 |
| SLC and above ${ }^{\text {h }}$ | 255 | 75.8 | (69.0-81.5) |  | 196 | 13.6 | (9.0-19.8) |  | 64.7 | (56.2-72.3) |  | 20.0 | (14.3-27.2) |  |
| Literate ${ }^{\text {d }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Able to read entire sentence | 109 | 58.4 | (47.2-68.9) |  | 63 | 26.5 | (16.5-39.7) |  | 64.7 | (50.2-77.0) |  | 7.9 | (2.4-23.2) |  |
| Read part of sentence | 119 | 54.0 | (43.3-64.3) | $<0.001$ | 71 | 41.5 | (29.0-55.1) | 0.262 | 55.7 | (42.1-68.6) | 0.797 | 2.6 | (0.6-11.2) | 0.017 |
| Cannot read any of sentence | 203 | 26.8 | (20.3-34.5) |  | 73 | 39.1 | (25.9-54.1) |  | 61.8 | (46.7-74.9) |  | 4.4 | (0.6-25.6) |  |
| Pregnancy Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 113 | 49.2 | (40.8-57.8) | 0.081 | 61 | 21.7 | (13.0-33.9) | 0.974 | 63.6 | (50.4-75.0) | 0.942 | 10.8 | (4.4-22.3) | 0.67 |
| Non-pregnant | 830 | 58.2 | (54.5-61.7) | 0.081 | 502 | 21.7 | (17.7-26.3) | , | 62.7 | (57.3-67.7) | , | 12.8 | (10.0-16.1) | 0.673 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First trimester | 32 | (62.4) | (42.0-79.1) |  | 19 | * | * |  | * | * |  | * | * |  |
| Second trimester | 42 | (48.5) | (31.9-65.4) | 0.157 | 22 | * | * | - | * | * | - | * | * |  |
| Third trimester | 39 | (38.8) | (23.1-57.3) |  | 20 | * | * |  | * | * |  | * | * |  |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 595 | 58.8 | (54.5-62.8) |  | 372 | 25.5 | (23.4-19.3) |  | 63.8 | (57.7-69.6) |  | 10.5 | (6.7-16.0) | 0 |
| No | 235 | 56.8 | (49-8-63.6) | 0.584 | 130 | 17.7 | (11.6-26.2) | 0.180 | 59.9 | (49.1-69.9) | , | 18.2 | (10.4-29.8) | 0.024 |

Table 6.14: Cont'd..

| Characteristics | Consumed Any Iron and Folic Acid Supplements After Last Delivery |  |  |  | $\mathbf{N}^{\text {c }}$ | Sources of Iron and Folic Acid Supplements ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Received from FCHV | Received from health center |  |  | Received from pharmacy |  |  |
|  | $\mathbf{N a}^{\text {a }}$ | \% | (95\% CI) | p-value |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 275 | 50.9 | (43.8-57.9) |  |  | 152 | 44.6 | (35.6-53.8) |  | 56.2 | (47.0-65.1) |  | 0.4 | (0.1-2.9) |  |
| Second | 202 | 53.2 | (44.8-61.4) |  | 122 | 36.9 | (27.2-47.7) |  | 66.5 | (55.9-75.6) |  | 1.4 | (0.3-6.2) |  |
| Middle | 160 | 47.8 | (38.9-56.8) | $<0.001$ | 82 | 24.4 | (15.1-37.0) | <0.001 | 60.3 | (47-72.2) | 0.245 | 14.5 | (7.2-27.2) | <0.001 |
| Fourth | 173 | 58.2 | (49.4-66.6) |  | 107 | 15.6 | (9.2-25.4) |  | 69.9 | (58.7-79.2) |  | 13.1 | (7.2-22.7) |  |
| Highest | 133 | 76.5 | (67.2-83.8) |  | 100 | 5.0 | (2.2-10.9) |  | 67.3 | (55.4-77.3) |  | 28.9 | (19.3-40.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 100 | 82.7 | (73.6-89.1) |  | 78 | 22.3 | (13.5-34.5) |  | 62.4 | (49.0-74.2) |  | 18.8 | (10.0-32.7) |  |
| Hill Chhetri | 248 | 62.1 | (54.1-69.5) |  | 162 | 37.2 | (28.6-46.7) |  | 52.9 | (43.0-62.6) |  | 12.3 | (6.7-21.3) |  |
| Terai Brahmin/Chhetri | 24 | * | * |  | 14 | * | * |  | * | * |  | * | * |  |
| Other Terai Caste | 64 | 34.9 | (23.6-48.2) |  | 22 | * | * |  | * | * |  | * | * |  |
| Hill Dalit | 146 | 74.7 | (65.9-81.8) | $<0.001$ | 105 | 26.0 | (17.4-36.9) | 0.003 | 73.1 | (62.3-81.7) | 0.002 | 1.7 | (0.5-5.5) | <0.001 |
| Terai Dalit | 39 | (35.8) | (21.6-5.0) |  | 15 | * | * | 0.003 | * |  | 0.002 | * | * | <0.001 |
| Newar | 31 | (70.0) | (50.2-84.3) |  | 20 | * | * |  | * | * |  | * | * |  |
| Hill Janajati | 207 | 48.3 | (40.2-56.5) |  | 105 | 21.1 | (13.4-31.6) |  | 72.9 | (61.5-81.9) |  | 3.8 | (0.9-14.2) |  |
| Terai Janajati | 60 | 54.5 | (39.8-68.4) |  | 32 | (12.5) | (5.4-26.4) |  | (61.1) | (40.8-78.2) |  | (28.4) | (13.3-50.6) |  |
| Muslim | 23 | * | * |  | 10 | * | * |  | * | * |  | * | * |  |
| Total | 943 | 57.0 | (53.1-60.8) |  | 563 | 23.7 | (20.0-28.0) |  | 64.5 | (59.6-69.2) |  | 12.7 | (9.4-17.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who had given birth in the last 5 years. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Multiple options possible. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {'Includes those who have consumed iron folic acid tablets. }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {I }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{8}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {h }}$ Includes those who have completed 10 and more yea | of sch | SLC: | chool Leaving C | ertificate. |  |  |  |  |  |  |  |  |  |  |

Table 6.15: After Last Delivery, Number of Iron and Folic Acid Supplement Tablets Consumed Among Women of Reproductive Age 15-49 Years Who Gave Birth in the Last 5 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathrm{N}^{\text {a }}$ | Median number of iron and folic acid tablets consumed ${ }^{\text {a.b }}$ |  | Number of tablets consumed ${ }^{\text {a,b }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | 45 or more |  |  | 30-44 |  |  | 15-29 |  |  | 1-14 |  |  |
|  |  | Median | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 89 | 45.0 | 13.3 | 67.2 | (55.0-77.5) |  | 13.2 | (6.6-24.7) |  | 10.0 | (4.8-19.8) |  | 9.6 | (4.6-19.0) |  |
| Central | 109 | 45.0 | 13.3 | 62.6 | (51.8-72.3) |  | 17.1 | (10.1-27.5) |  | 10.8 | (5.7-19.5) |  | 9.4 | (5.0-17.0) |  |
| Western | 99 | 45.0 | 13.1 | 81.4 | (70.9-88.7) | 0.001 | 5.5 | (2.2-12.8) | 0.042 | 3.0 | (0.9-9.8) | 0.083 | 10.1 | (4.9-19.9) | 0.500 |
| Mid-western | 122 | 45.0 | 11.1 | 76.3 | (67.7-83.2) |  | 12.7 | (7.8-20.0) |  | 4.1 | (1.5-10.5) |  | 6.9 | (3.6-12.8) |  |
| Far-western | 144 | 45.0 | 9.2 | 84.0 | (76.5-89.4) |  | 7.4 | (4.1-13.1) |  | 5.7 | (2.8-11.5) |  | 2.9 | (0.9-8.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 108 | 45.0 | 11.0 | 81.9 | (72.6-88.5) |  | 6.1 | (2.7-13.2) |  | 4.4 | (1.8-10.4) |  | 7.6 | (3.6-15.5) |  |
| Hill | 274 | 45.0 | 11.7 | 76.6 | (69.3-82.6) | 0.002 | 10.3 | (6.1-17.0) | 0.097 | 6.5 | (3.5-11.7) | 0.332 | 6.6 | (3.8-11.0) | 0.201 |
| Terai | 181 | 45.0 | 13.9 | 63.8 | (55.3-71.5) |  | 15.9 | (10.7-23.2) |  | 9.4 | (5.5-15.8) |  | 10.8 | (6.6-17.4) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 83 | 45.0 | 13.9 | 70.3 | (57.2-80.7) |  | 10.8 | (4.7-22.7) |  | 6.0 | (2.0-16.5) |  | 12.9 | (6.7-23.4) |  |
| Rural | 480 | 45.0 | 12.4 | 72.1 | (66.6-77.1) |  | 12.5 | (8.9-17.2) |  | 7.8 | (5.1-11.6) | 0.723 | 7.6 | (5.1-11.2) | 0.102 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 17 | * | * | * | * |  | * | * |  | * | * |  | * | * |  |
| 20-29 | 407 | 45.0 | 12.9 | 70.1 | (64.0-75.6) |  | 12.9 | (8.9-18.2) |  | 7.7 | (4.9-11.8) |  | 9.3 | (6.3-13.5) |  |
| 30-39 | 123 | 45.0 | 11.4 | 78.3 | (68.0-85.9) | 0.078 | 11.3 | (6.0-20.2) | 0.643 | 4.1 | (1.3-12.2) | 0.202 | 6.3 | (2.8-13.6) | 0.274 |
| 40-49 | 16 | * | * | * | * |  | * | * |  | * |  |  | * | * |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 117 | 45.0 | 12.8 | 72.1 | (59.3-82.1) |  | 11.0 | (5.1-22.3) |  | 10.9 | (5.9-19.3) |  | 5.9 | (2.4-13.7) |  |
| Primary ${ }^{\text {e }}$ | 92 | 45.0 | 12.7 | 66.1 | (55.4-75.4) |  | 15.4 | (8.9-25.4) |  | 10.5 | (5.3-19.7) |  | 8.0 | (3.4-17.7) |  |
| Some secondary ${ }^{4}$ | 158 | 45.0 | 12.0 | 71.3 | (61.7-79.3) | 0.570 | 14.7 | (9.3-22.5) | 0.436 | 6.6 | (3.4-12.2) | 0.370 | 7.4 | (4.0-13.4) | 0.632 |
| SLC and above ${ }^{\text {g }}$ | 196 | 45.0 | 13.1 | 74.4 | (66.3-81.1) |  | 9.7 | (5.4-16.9) |  | 5.7 | (3.1-10.3) |  | 10.2 | (6.1-16.5) |  |
| Literate ${ }^{\text {c }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Able to read entire sentence | 63 | 45.0 | 11.3 | 70.5 | (55.2-82.3) |  | 19.7 | (10.2-34.6) |  | 2.4 | (0.6-9.9) |  | 7.4 | (2.2-22.6) |  |
| Read part of sentence | 71 | 45.0 | 13.5 | 80.4 | (66.0-89.6) | 0.033 | 2.6 | (0.6-11.5) | 0.031 | 8.1 | (2.5-23.3) | 0.003 | 8.9 | (3.6-20.3) | 0.690 |
| Cannot read any of sentence | 73 | 45.0 | 13.2 | 55.0 | (39.5-69.6) |  | 17.3 | (7.8-33.9) |  | 22.9 | (11-41.6) |  | 4.8 | (1.7-12.7) |  |
| Pregnancy Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pregnant | 61 | 45.0 | 12.6 | 71.7 | (57.0-82.9) | 0.988 | 12.7 | (5.5-26.7) | 0.953 | 5.9 | (3.4-10.1) | 0.537 | 9.7 | (3.4-24.6) | 0.872 |
| Non-pregnant | 502 | 45.0 | 12.7 | 71.9 | (66.3-76.9) |  | 12.2 | (9.0-16.4) | 0.953 | 7.7 | (5.4-10.8) | 0.53 | 8.2 | (5.9-11.4) | 0.872 |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 372 | 45.0 | 13.1 | 72.0 | (65.9-77.4) |  | 11.2 | (7.3-16.7) |  | 8.0 | (5.4-11.7) |  | 8.8 | (5.8-13.0) |  |
| No | 130 | 45.0 | 11.6 | 71.5 | (61.0 80.1) | 0.910 | 14.6 | (9.5 21.7) | 0.306 | 6.9 | (3.1 14.7) | 0.592 | 7.0 | (3.6 13.1) | 0.613 |

Table 6.15: Cont'd. .

| Characteristics | $\mathbf{N}^{\text {b }}$ | Median number of iron and folic acid tablets consumed ${ }^{\text {c }}$ |  | Number of tablets consumed ${ }^{\text {c }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | 45 or more |  |  | 30-44 |  |  | 15-29 |  |  | 1-14 |  |  |
|  |  | Median | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 152 | 45.0 | 10.3 | 81.5 | (72.0-88.3) |  | 8.7 | (4.1-17.4) |  | 5.6 | (2.1-14.0) |  | 4.2 | (2.0-8.9) |  |
| Second | 122 | 45.0 | 14.0 | 62.7 | (51.3-72.8) |  | 15.5 | (8.7-26.1) |  | 13.1 | (6.6-24.4) |  | 8.7 | (4.3-16.9) |  |
| Middle | 82 | 45.0 | 12.1 | 74.1 | (61.1-83.9) | 0.066 | 12.6 | (5.8-25.1) | 0.625 | 4.1 | (1.4-11.3) | 0.074 | 9.2 | (4-19.8) | 0.165 |
| Fourth | 107 | 45.0 | 13.1 | 70.6 | (58.8-80.2) |  | 11.0 | (5.5-20.7) |  | 5.0 | (1.7-14.1) |  | 13.3 | (6.9-24.1) |  |
| Highest | 100 | 45.0 | 12.8 | 71.4 | (59.5-80.9) |  | 13.3 | (6.5-25.3) |  | 9.1 | (4.4-18.0) |  | 6.2 | (2.8-13.2) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 78 | 45.0 | 11.5 | 85.5 | (73.5-92.6) |  | 5.4 | (1.6-16.7) |  | 3.8 | (1.0-14.2) |  | 5.3 | (1.9-14.1) |  |
| Hill Chhetri | 162 | 45.0 | 10.7 | 69.4 | (57.8-78.9) |  | 20.4 | (11.9-32.6) |  | 5.3 | (2.0-13.2) |  | 5.0 | (2.2-11.0) |  |
| Terai Brahmin/Chhetri | 14 | * | * | * | * |  | * | * |  | * | * |  | * | * |  |
| Other Terai Caste | 22 | * | * | * | * |  | * | * |  | * | * |  | * | * |  |
| Hill Dalit | 105 | 45.0 | 12.6 | 79.7 | (68.4-87.7) | 0.036 | 4.7 | (2.0-10.4) | 0.001 | 4.1 | (1.3-12.0) | 0.017 | 11.5 | (5.4-22.9) | 0.298 |
| Terai Dalit | 15 | * | * | * | * |  | * | * | 0.001 | * | * | 0.017 | * | * |  |
| Newar | 20 | * | * | * | * |  | * | * |  | * | * |  | * | * |  |
| Hill Janajati | 105 | 45.0 | 14.3 | 69.0 | (57.0-78.8) |  | 6.1 | (2.3-15.5) |  | 14.3 | (7.5-25.7) |  | 10.6 | (5.4-19.7) |  |
| Terai Janajati | 32 | (45.0) | (11.8) | (75.0) | (55.5-87.8) |  | (13.4) | (4.9-31.8) |  | (4.2) | (1.0-16.1) |  | (7.4) | (1.6-27.6) |  |
| Muslim | 10 | * | * | * | * |  | * | - |  | * | * |  | * | * |  |
| Total | 563 | 45.0 | 12.6 | 71.9 | (66.8-76.4) |  | 12.2 | (9.0-16.5) |  | 7.5 | (5.1-11.0) |  | 8.4 | (5.9-11.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who had given birth in the last 5 years. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Among those who consumed any iron and folic acid tablets during pregnancy in the last 5 years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{8}$ Includes those who have completed 10 and mo | years of | hool. SLC: S | Leaving C | ficate. |  |  |  |  |  |  |  |  |  |  |  |

Table 6.16: After Last Delivery, Consumed Vitamin A Capsule Within 6 Weeks (within 45 days) Among Women of Reproductive Age 15-49 Years Who Gave Birth in the Last 5 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathbf{N a}^{\text {a }}$ | Consumed vitamin A capsule |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 182 | 38.8 | (31.0-47.2) |  |
| Central | 193 | 45.4 | (38.0-53.1) |  |
| Western | 162 | 50.4 | (41.6-59.2) | 0.012 |
| Mid-western | 199 | 43.3 | (36.2-50.6) |  |
| Far-western | 207 | 59.3 | (52.1-66.1) |  |
| Ecological Region |  |  |  |  |
| Mountain | 167 | 57.0 | (48.6-65.0) |  |
| Hill | 421 | 50.6 | (44.8-56.3) | 0.001 |
| Terai | 355 | 39.9 | (34.3-45.8) |  |
| Location |  |  |  |  |
| Urban | 111 | 52.9 | (41.7-63.8) | 0.168 |
| Rural | 832 | 45.2 | (41.1-49.3) | 0.168 |
| Age, years |  |  |  |  |
| 15-19 | 35 | (40.3) | (23.1-60.3) |  |
| 20-29 | 645 | 47.5 | (42.8-52.2) | 0.419 |
| 30-39 | 230 | 44.1 | (36.6-51.9) |  |
| 40-49 | 33 | (34.0) | (17.2-56.1) |  |
| Education |  |  |  |  |
| No education ${ }^{\text {c }}$ | 262 | 35.6 | (30.6-40.8) |  |
| Primary ${ }^{\text {d }}$ | 171 | 41.1 | (33.2-49.5) | 0.001 |
| Some secondarye | 255 | 48.2 | (42.6-53.9) | 0.001 |
| SLC and above ${ }^{\text {f }}$ | 255 | 55.8 | (47.7-63.6) |  |
| Literate ${ }^{\text {b }}$ |  |  |  |  |
| Able to read entire sentence | 109 | 45.9 | (35.3-56.9) |  |
| Read part of sentence | 119 | 37.7 | (28.1-48.3) | 0.247 |
| Cannot read any of sentence | 203 | 33.5 | (26.1-41.7) |  |
| Pregnancy Status |  |  |  |  |
| Pregnant | 113 | 44.2 | (35.0-53.7) | 0.702 |
| Non-pregnant | 830 | 46.3 | (42.0-50.6) | 0.702 |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |
| First trimester | 32 | (62.3) | (41.6-79.4) |  |
| Second trimester | 42 | (38.3) | (23.4-55.8) | 0.042 |
| Third trimester | 39 | (35.5) | (20.1-54.6) |  |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  |  |
| Yes | 595 | 43.8 | (39.2-48.4) | 0.032 |
| No | 235 | 52.0 | (44.5-59.5) | 0.032 |
| Wealth Quintile |  |  |  |  |
| Lowest | 275 | 43.0 | (36.3-50.1) |  |
| Second | 202 | 36.4 | (29.2-44.4) |  |
| Middle | 160 | 42.0 | (33.4-51.1) | 0.001 |
| Fourth | 173 | 51.7 | (42.9-60.3) |  |
| Highest | 133 | 57.6 | (47.4-67.1) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 100 | 60.8 | (49.1-71.3) |  |
| Hill Chhetri | 248 | 52.4 | (44.5-60.3) |  |
| Terai Brahmin/Chhetri | 24 | * | * |  |
| Other Terai Caste | 64 | 29.7 | (19.1-43.1) |  |
| Hill Dalit | 146 | 50.6 | (40.8-60.3) | <0.001 |
| Terai Dalit | 39 | (35.4) | (21.6-52.2) | <0.001 |
| Newar | 31 | 54.8) | (35.3-72.9) |  |
| Hill Janajati | 207 | (41.2 | (33.5-49.4) |  |
| Terai Janajati | 60 | 45.2 | (31.2-60.0) |  |
| Muslim | 23 | * | * |  |
| Total | 943 | 46.0 | (42.2-49.9) |  |

[^24]Table 6.17: During Last Pregnancy, Receipt of Infant and Young Child Feeding Counseling, Among Women of Reproductive Age 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathbf{N a}^{\text {a }}$ | Did not receive counseling during last pregnancy ${ }^{\text {a }}$ |  |  | Received counseling from ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | FCHV |  |  | Health worker |  |  | Both FCHV and health worker |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  | <0.001 |  |  | <0.001 |  |  | 0.058 |  |  | <0.001 |
| Eastern | 182 | 57.2 | (48.8-65.2) |  | 18.4 | (12.7-26.0) |  | 18.0 | (12.4-25.4) |  | 6.4 | (3.7-11.0) |  |
| Central | 193 | 54.5 | (46.8-62.0) |  | 13.1 | (8.8-19.2) |  | 24.4 | (18.3-31.6) |  | 8.0 | (4.7-13.2) |  |
| Western | 162 | 43.4 | (34.9-52.4) |  | 24.5 | (17.8-32.8) |  | 17.2 | (11.5-25.0) |  | 13.3 | (8.3-20.6) |  |
| Mid-western | 199 | 36.7 | (29.9-44.0) |  | 27.5 | (21.4-34.5) |  | 13.4 | (9.3-19.0) |  | 22.4 | (17.0-29.0) |  |
| Far-western | 207 | 35.6 | (29.0-42.8) |  | 30.0 | (23.9-36.9) |  | 17.2 | (12.5-23.1) |  | 17.3 | (12.8-23.0) |  |
| Ecological Region |  |  |  | <0.001 |  |  | 0.389 |  |  | 0.513 |  |  | <0.001 |
| Mountain | 167 | 31.6 | (24.2-40.1) |  | 27.0 | (20.3-34.9) |  | 20.9 | (14.7-28.8) |  | 20.6 | (14.7-28.0) |  |
| Hill | 421 | 44.8 | (39.1-50.6) |  | 19.3 | (15.4-23.9) |  | 20.9 | (16.4-26.2) |  | 14.4 | (11.0-18.6) |  |
| Terai | 355 | 55.1 | (49.2-60.9) |  | 19.6 | (15.4-24.6) |  | 17.9 | (13.7-23.0) |  | 7.4 | (5.0-10.9) |  |
| Location |  |  |  | 0.373 |  |  | 0.039 |  |  | <0.001 |  |  | 0.067 |
| Urban | 111 | 44.6 | (33.8-55.9) |  | 12.4 | (6.8-21.7) |  | 37.1 | (26.9-48.6) |  | 5.9 | (3.1-10.7) |  |
| Rural | 832 | 49.2 | (45.0-53.3) |  | 21.0 | (18.0-24.4) |  | 17.3 | (14.2-20.8) |  | 12.3 | (10.0-15.0) |  |
| Age, years |  |  |  | 0.032 |  |  | 0.611 |  |  | 0.162 |  |  | 0.213 |
| 15-19 | 35 | (52.3) | (33.2-70.8) |  | (28.1) | (13.5-49.6) |  | (16.0) | (6.7-33.4) |  | (3.6) | (0.9-13.6) |  |
| 20-29 | 645 | 45.4 | (40.8-50.1) |  | 20.2 | (16.9-24.0) |  | 21.4 | (17.7-25.6) |  | 12.7 | (10.0-15.9) |  |
| 30-39 | 230 | 56.7 | (48.9-64.1) |  | 18.6 | (13.4-25.2) |  | 15.1 | (10.3-21.7) |  | 9.6 | (6.4-14.1) |  |
| 40-49 | 33 | (57.8) | (36.7-76.3) |  | (16.8) | (7.5-33.4) |  | (12.6) | (3.1-39.2) |  | (12.9) | (5.4-27.7) |  |
| Education |  |  |  | <0.001 |  |  |  |  |  | <0.001 |  |  | 0.898 |
| No education ${ }^{\text {d }}$ | 262 | 58.6 | (52.6-64.4) |  | 18.6 | (14.2-24.0) | 0.758 | 9.9 | (6.7-14.4) |  | 12.8 | (9.3-17.5) |  |
| Primarye | 171 | 55.1 | (47.1-62.8) |  | 21.7 | (16.2-28.4) |  | 12.6 | (7.7-19.8) |  | 10.7 | (7.4-15.2) |  |
| Some secondary ${ }^{\mathrm{f}}$ | 254 | 46.5 | (40.6-52.6) |  | 18.9 | (15.0-23.4) |  | 22.8 | (16.8-30.2) |  | 11.8 | (8.7-15.8) |  |
| SLC and above ${ }^{\text {g }}$ | 255 | 38.8 | (42.5-45.5) |  | 21.6 | (16.7-27.5) |  | 28.6 | (22.7-35.5) |  | 10.9 | (7.7-15.3) |  |
| Literate ${ }^{\text {c }}$ |  |  |  |  |  |  | 0.161 |  |  | 0.064 |  |  | 0.788 |
| Able to read entire sentence | 109 | 54.3 | (43.4-64.8) | 0.002 | 19.5 | (12.7-28.7) |  | 11.8 | (6.3-21.1) |  | 14.3 | (8.8-22.5) |  |
| Read part of sentence | 119 | 43.2 | (33.1-53.9) |  | 27.1 | (19.0-37.0) |  | 17.8 | (10.8-27.8) |  | 12.0 | (6.9-20.0) |  |
| Cannot read any of sentence | 203 | 65.4 | (57.2-72.7) |  | 16.5 | (11.6-23.0) |  | 7.2 | (4.1-12.2) |  | 11.0 | (6.7-17.4) |  |
| Pregnancy Status |  |  |  | 0.160 |  |  | 0.443 |  |  | 0.722 |  |  | 0.669 |
| Pregnant | 113 | 54.6 | (44.6-64.2) |  | 17.0 | (11.1-25.3) |  | 18.1 | (10.3-29.9) |  | 10.3 | (6.8-15.1) |  |
| Non-pregnant | 829 | 47.9 | (44.5-51.4) |  | 20.5 | (17.8-23.6) |  | 19.7 | (16.5-23.3) |  | 11.8 | (9.6-14.4) |  |
| Trimester of Pregnancy |  |  |  | 0.432 |  |  | 0.013 |  |  | 0.029 |  |  | 0.144 |
| (among pregnant women) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| First trimester | 32 | (56.5) | (36.7-74.4) |  | (33.2) | (17.6-53.6) |  | (2.8) | (0.7-11.3) |  | (7.5) | (2.8-18.4) |  |
| Second trimester | 42 | (60.3) | (42.7-75.6) |  | (9.1) | (3.1-24.0) |  | (24.9) | (12.5-43.4) |  | (5.7) | (2.0-15.3) |  |
| Third trimester | 39 | (46.1) | (28.4-64.7) |  | (12.6) | (4.9-29.0) |  | (23.2) | (11.0-42.6) |  | (18.1) | (8.0-36.0) |  |
| Lactating Status (among those who gave birth in the last 5 years) |  |  |  | 0.464 |  |  | 0.552 |  |  | 0.078 | $\begin{array}{r} 13.8 \\ 7.3 \end{array}$ |  | 0.008 |
| Yes | 595 | 47.2 | (43.2-51.3) |  | 21.1 | (17.9-24.7) |  | 18.0 | (14.5-22.0) |  |  | (11.0-17.2) |  |
| No | 234 | 49.7 | (42.9-56.5) |  | 19.3 | (14.8-24.8) |  | 23.7 | (16.9-32.1) |  |  | (5.5-9.7) |  |
| Wealth Quintile |  |  |  | <0.001 |  |  |  |  |  | <0.001 |  |  | <0.001 |
| Lowest | 275 | 44.7 | (37.7-51.8) |  | 22.8 | (17.8-28.8) | 0.026 | 11.9 | (8.2-17.0) |  | 20.6 | (15.6-26.6) |  |
| Second | 202 | 60.4 | (52.4-67.9) |  | 20.2 | (14.7-27.1) |  | 9.4 | (6.0-14.4) |  | 10.0 | (6.4-15.4) |  |
| Middle | 160 | 45.7 | (36.8-54.8) |  | 25.8 | (18.7-34.6) |  | 18.9 | (12.9-26.8) |  | 9.6 | (5.5-16.3) |  |
| Fourth | 173 | 54.7 | (45.9-63.2) |  | 18.9 | (13.0-26.6) |  | 19.9 | (13.9-27.6) |  | 5.4 | (2.7-10.2) |  |
| Highest | 133 | 36.3 | (27.4-46.3) |  | 12.0 | (7.1-19.5) |  | 39.1 | (29.5-49.6) |  | 12.6 | (7.6-20.2) |  |
| Ethnicity |  |  |  | <0.001 |  |  | 0.034 |  |  | 0.002 |  |  | 0.003 |
| Hill Brahmin | 100 | 37.7 | (27.0-49.7) |  | 18.2 | (11.3-28.0) |  | 25.9 | (17.2-37.1) |  | 18.2 | (11.4-27.8) |  |
| Hill Chhetri | 248 | 38.0 | (30.7-45.9) |  | 23.2 | (17.5-30.0) |  | 21.5 | (14.9-30.1) |  | 17.3 | (12.5-23.4) |  |
| Terai Brahmin/Chhetri | 24 | * | * |  | * | * |  | * | * |  | * | * |  |
| Other Terai Caste | 64 | 64.1 | (50.8-75.5) |  | 14.0 | (7.3-25.4) |  | 11.2 | (5.3-22.3) |  | 10.7 | (4.7-22.5) |  |
| Hill Dalit | 146 | 37.3 | (28.3-47.3) |  | 22.5 | (15.7-31.1) |  | 22.0 | (14.6-31.8) |  | 15.9 | (10.5-23.3) |  |
| Terai Dalit | 39 | (57.4) | (40.3-73.0) |  | (27.2) | (14.5-45.1) |  | (12.7) | (5.1-28.2) |  | (2.7) | (0.4-16.8) |  |
| Newar | 31 | (47.7) | (29.0-67.0) |  | (6.8) | (1.4-27.4) |  | (39.9) | (22.5-60.2) |  | (5.6) | (1.2-22.5) |  |
| Hill Janajati | 207 | 55.6 | (47.5-63.5) |  | 17.0 | (11.9-23.7) |  | 17.5 | (12.2-24.4) |  | 9.9 | (6.0-15.7) |  |
| Terai Janajati | 60 | 53.2 | (38.5-67.2) |  | 30.5 | (18.8-45.5) |  | 13.4 | (5.6-28.9) |  | 2.9 | (0.9-9.0) |  |
| Muslim | 23 | * | * |  | * | * |  | * | - |  | * | * |  |
| Total | 943 | 48.7 | (44.8-52.5) |  | 20.0 | (17.2-23.2) |  | 19.4 | (16.5-22.8) |  | 11.6 | (9.5-14.0) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Among those who gave birth in last 5 years
${ }^{6}$ Multiple options possible.
${ }^{\text {chen }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card.
${ }^{\text {d }}$ Includes those who have never attended school
${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
IIncludes those who have completed 6-9 years of school.
${ }^{\text {g Includes those }} 10$ and more years of school. SLC: School Leaving Certificate.

Table 6.18: After Delivery, Receipt of Infant and Young Child Feeding Counseling, Among Women of Reproductive Age 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathbf{N a}^{\text {a }}$ | Did not receive counseling after delivery ${ }^{\text {a }}$ |  |  | Received counseling from ${ }^{\text {b }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | FCHV |  |  | Health worker |  |  | Both FCHV and health worker |  |  |
|  |  | \% | (95\% CI) | -value | \% | (95\% CI) | p-value | \% | (95\% CI) | pvalue | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 182 \\ & 193 \\ & 161 \\ & 199 \\ & 207 \end{aligned}$ | $\begin{aligned} & 58.3 \\ & 47.6 \\ & 38.5 \\ & 31.6 \\ & 15.7 \end{aligned}$ | $\begin{aligned} & (49.9-66.2) \\ & (40.1-55.2) \\ & (30.2-47.5) \\ & (25.2-38.8) \\ & (11.1-21.7) \end{aligned}$ | <0.001 | $\begin{aligned} & 19.4 \\ & 14.6 \\ & 25.9 \\ & 29.3 \\ & 38.2 \end{aligned}$ | $\begin{aligned} & (13.6-27.0) \\ & (10.0-20.8) \\ & (19.0-34.3) \\ & (23.1-36.3) \\ & (31.5-45.3) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 14.4 \\ & 26.9 \\ & 17.2 \\ & 16.6 \\ & 19.2 \\ & \hline \end{aligned}$ | $\begin{array}{r} (9.5-21.2) \\ (20.6-34.2) \\ (11.4-25.1) \\ (11.9-22.7) \\ (14.1-25.4) \\ \hline \end{array}$ | 0.004 | $\begin{array}{r} 7.9 \\ 10.9 \\ 18.4 \\ 22.5 \\ 27.0 \end{array}$ | $\begin{array}{r} (4.7-13.0) \\ (7.0-16.8) \\ (12.4-26.5) \\ (17.0-29.1) \\ (21.2-33.7) \\ \hline \end{array}$ | <0.001 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{array}{r} 167 \\ 420 \\ 355 \\ \hline \end{array}$ | $\begin{array}{r} 24.8 \\ 34.6 \\ 53.3 \\ \hline \end{array}$ | $\begin{aligned} & (18.3-32.8) \\ & (29.2-40.3) \\ & (47.4-59.1) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 38.1 \\ & 22.8 \\ & 19.0 \end{aligned}$ | $\begin{aligned} & (30.3-46.6) \\ & (18.5-27.7) \\ & (14.8-23.9) \\ & \hline \end{aligned}$ | 0.002 | $\begin{aligned} & 17.0 \\ & 23.1 \\ & 18.1 \end{aligned}$ | $\begin{aligned} & (11.4-24.6) \\ & (18.4-28.5) \\ & (14.0-23.1) \\ & \hline \end{aligned}$ | 0.153 | $\begin{array}{r} 20.1 \\ 19.6 \\ 9.6 \\ \hline \end{array}$ | $\begin{array}{r} (14.1-27.7) \\ (15.5-24.5) \\ (6.9-13.2) \\ \hline \end{array}$ | <0.001 |
| Location <br> Urban <br> Rural | $\begin{aligned} & 111 \\ & 831 \end{aligned}$ | $\begin{aligned} & 29.8 \\ & 44.3 \end{aligned}$ | $\begin{aligned} & (20.6-41.1) \\ & (40.2-48.5) \\ & \hline \end{aligned}$ | 0.006 |  | $\begin{array}{r} (10.5-27.5) \\ (19.6-26.2) \\ \hline \end{array}$ | 0.209 | $\begin{aligned} & 42.6 \\ & 17.5 \end{aligned}$ | $\begin{array}{r} (32-53.8) \\ (14.4-21.0) \\ \hline \end{array}$ | 0.000 |  | $\begin{array}{r} (5.0-19.4) \\ (12.9-18.5) \\ \hline \end{array}$ | 0.157 |
| Age, years <br> $15-19$ <br> $20-29$ <br> $30-39$ <br> $40-49$ | $\begin{array}{r} 35 \\ 644 \\ 230 \\ 33 \\ \hline \end{array}$ | $\begin{array}{r} (45.0) \\ 39.9 \\ 51.4 \\ (35.9) \\ \hline \end{array}$ | $\begin{aligned} & (26.9-64.5) \\ & (35.4-44.7) \\ & (43.6-59.0) \\ & (17.5-59.8) \\ & \hline \end{aligned}$ | 0.028 | $\begin{array}{r} (26.7) \\ 21.7 \\ 20.4 \\ (41.7) \\ \hline \end{array}$ | $\begin{aligned} & (12.9-47.2) \\ & (18.2-25.6) \\ & (15.1-27.0) \\ & (23.2-62.8) \\ & \hline \end{aligned}$ | 0.097 | $\begin{array}{r} (19.5) \\ 22.3 \\ 15.4 \\ (10.9) \\ \hline \end{array}$ | $\begin{array}{r} (8.0-40.2) \\ (18.6-26.6) \\ (10.6-21.9) \\ (2.2-39.7) \\ \hline \end{array}$ | 0.126 | $\begin{array}{r} (8.9) \\ 16.1 \\ 12.9 \\ (11.5) \\ \hline \end{array}$ | $\begin{array}{r} (2.4-27.6) \\ (13.1-19.6) \\ (8.8-18.5) \\ (4.5-26.3) \\ \hline \end{array}$ | 0.408 |
| Education <br> No education ${ }^{\text {d }}$ <br> Primary ${ }^{e}$ <br> Some secondary ${ }^{f}$ SLC and above ${ }^{g}$ | $\begin{aligned} & 262 \\ & 171 \\ & 255 \\ & 254 \\ & \hline \end{aligned}$ | $\begin{aligned} & 52.9 \\ & 47.0 \\ & 41.6 \\ & 32.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & (47.1-58.6) \\ & (38.8-55.4) \\ & (35.8-47.5) \\ & (25.8-40.1) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 24.3 \\ & 21.7 \\ & 21.1 \\ & 21.4 \\ & \hline \end{aligned}$ | $\begin{aligned} & (20.0-29.3) \\ & (16.6-27.7) \\ & (17.0-26.0) \\ & (16.2-27.7) \\ & \hline \end{aligned}$ | 0.832 | $\begin{aligned} & 11.2 \\ & 15.8 \\ & 21.6 \\ & 29.4 \\ & \hline \end{aligned}$ | $\begin{array}{r} (7.2-17.1) \\ (10.0-24.1) \\ (16.1-28.3) \\ (23.3-36.4) \\ \hline \end{array}$ | <0.001 | $\begin{aligned} & 11.6 \\ & 15.5 \\ & 15.7 \\ & 16.7 \\ & \hline \end{aligned}$ | $\begin{array}{r} (9.1-14.6) \\ (11.3-20.9) \\ (11.5-21.1) \\ (12.7-21.5) \\ \hline \end{array}$ | 0.386 |
| Literate $^{\mathrm{c}}$ <br> Able to read entire sentence <br> Read part of sentence Cannot read any of sentence | $\begin{array}{r} 109 \\ 119 \\ 203 \\ \hline \end{array}$ | $\begin{aligned} & 45.5 \\ & 35.2 \\ & 60.5 \end{aligned}$ | $\begin{aligned} & (34.6-56.8) \\ & (25.6-46.1) \\ & (52.1-68.2) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 23.5 \\ & 31.5 \\ & 19.3 \\ & \hline \end{aligned}$ | $\begin{aligned} & (16.1-33.0) \\ & (22.8-41.9) \\ & (14.1-25.8) \\ & \hline \end{aligned}$ | 0.135 | $\begin{aligned} & 13.2 \\ & 18.0 \\ & 10.5 \\ & \hline \end{aligned}$ | $\begin{array}{r} (7.6-22.2) \\ (11.0-28.0) \\ (6.2-17.2) \\ \hline \end{array}$ | 0.358 | $\begin{array}{r} 17.7 \\ 15.3 \\ 9.8 \\ \hline \end{array}$ | $\begin{array}{r} (11.4-26.5) \\ (9.5-23.6) \\ (6.0-15.6) \\ \hline \end{array}$ | 0.243 |
| Pregnancy Status <br> Pregnant <br> Non-pregnant | $\begin{aligned} & 113 \\ & 829 \\ & \hline \end{aligned}$ | $\begin{aligned} & 54.4 \\ & 41.0 \\ & \hline \end{aligned}$ | $\begin{array}{r} (45.3-63.3) \\ (37.6-44.5) \\ \hline \end{array}$ | 0.005 | $\begin{aligned} & 15.1 \\ & 23.2 \\ & \hline \end{aligned}$ | $\begin{array}{r} (9.7-22.8) \\ (20.1-26.6) \\ \hline \end{array}$ | 0.043 | $\begin{array}{r} 14.6 \\ 21.1 \\ \hline \end{array}$ | $\begin{array}{r} (9.5-21.7) \\ (18.1-24.4) \\ \hline \end{array}$ | 0.115 |  | $\begin{aligned} & (11.3-21.7) \\ & (12.5-17.3) \\ & \hline \end{aligned}$ | 0.801 |
| Trimester of Pregnancy (among pregnant women) <br> First trimester <br> Second trimester <br> Third trimester | $\begin{aligned} & 32 \\ & 42 \\ & 39 \\ & \hline \end{aligned}$ | $\begin{aligned} & (44.8) \\ & (60.5) \\ & (55.4) \\ & \hline \end{aligned}$ | $\begin{aligned} & (25.9-65.4) \\ & (43.2-75.6) \\ & (37.0-72.4) \\ & \hline \end{aligned}$ | 0.440 | $\begin{array}{r} (31.5) \\ (11.6) \\ (5.3) \\ \hline \end{array}$ | $\begin{array}{r} (16.3-51.9) \\ (4.6-26.0) \\ (2.1-13.1) \end{array}$ | 0.006 | $\begin{aligned} & (12.4) \\ & (17.9) \\ & (12.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & (3.7-34.2) \\ & (8.2-34.8) \\ & (4.9-29.1) \\ & \hline \end{aligned}$ | 0.766 | $\begin{array}{\|l} \hline(11.3) \\ (10.0) \\ (26.6) \\ \hline \end{array}$ | $\begin{array}{r} (4.6-25.0) \\ (3.6-25.1) \\ (13.5-45.6) \\ \hline \end{array}$ | 0.081 |
| Lactating Status (among those who gave birth in the last 5 years) <br> Yes <br> No | $\begin{aligned} & 595 \\ & 234 \\ & \hline \end{aligned}$ | $\begin{aligned} & 40.4 \\ & 42.3 \end{aligned}$ | $\begin{aligned} & (36.7-44.3) \\ & (36.0-48.9) \\ & \hline \end{aligned}$ | 0.626 |  | $\begin{array}{r} (21.0-28.3) \\ (15.1-26.2) \\ \hline \end{array}$ | 0.177 | $\begin{aligned} & 19.2 \\ & 25.4 \end{aligned}$ | $\begin{aligned} & (16.2-22.7) \\ & (19.1-32.8) \\ & \hline \end{aligned}$ | 0.057 | $\begin{aligned} & 15.8 \\ & 12.2 \\ & \hline \end{aligned}$ | $\begin{array}{r} (13.2-18.8) \\ (9.2-16.1) \\ \hline \end{array}$ | 0.180 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 275 \\ & 201 \\ & 160 \\ & 173 \\ & 133 \end{aligned}$ | $\begin{aligned} & 37.6 \\ & 49.3 \\ & 48.6 \\ & 48.5 \\ & 28.2 \\ & \hline \end{aligned}$ | $\begin{aligned} & (30.8-44.9) \\ & (41.0-57.7) \\ & (39.6-57.7) \\ & (39.8-57.3) \\ & (20.3-37.9) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 28.3 \\ & 24.6 \\ & 24.2 \\ & 21.9 \\ & 10.5 \\ & \hline \end{aligned}$ | $\begin{array}{r} (22.7-34.7) \\ (18.4-32.0) \\ (17.3-32.8) \\ (15.6-29.8) \\ (5.9-18.1) \\ \hline \end{array}$ | 0.001 | $\begin{aligned} & 10.8 \\ & 11.6 \\ & 15.5 \\ & 22.3 \\ & 42.9 \end{aligned}$ | $\begin{array}{r} (7.2-15.8) \\ (7.5-17.7) \\ (10.3-22.8) \\ (16.0-30.2) \\ (33.2-53.1) \\ \hline \end{array}$ | 0.000 | $\begin{array}{r} 23.3 \\ 14.5 \\ 11.6 \\ 7.2 \\ 18.4 \end{array}$ | $\begin{array}{r} (17.9-29.6) \\ (9.9-20.7) \\ (7.1-18.6) \\ (3.9-12.9) \\ (12.0-27.0) \\ \hline \end{array}$ | $<0.001$ |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai Caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | 99 248 24 64 146 39 31 207 60 23 | 33.2 29.8 $*$ 63.4 29.0 $(62.2)$ $(42.9)$ 46.9 46.1 | $\begin{array}{r} (23.0-45.3) \\ (23.0-37.7) \\ * \\ (50.2-74.9) \\ (20.5-39.1) \\ (44.8-76.9) \\ (25.0-62.9) \\ (38.8-55.1) \\ (32.2-60.7) \end{array}$ | <0.001 | $\begin{array}{r} 24.3 \\ 27.9 \\ * \\ 14.3 \\ 26.5 \\ (20.2) \\ (10.2) \\ 19.8 \\ 29.7 \end{array}$ | $\begin{array}{r} (15.9-35.2) \\ (21.9-34.8) \\ * \\ (7.5-25.5) \\ (19.3-35.3) \\ (9.1-39.0) \\ (3.2-28.0) \\ (14.2-27.0) \\ (18.1-44.8) \end{array}$ | 0.045 | 18.6 20.3 $*$ 14.5 25.0 $(13.0)$ $(35.7)$ 21.6 16.7 $*$ | $\begin{array}{r} (11.3-29.1) \\ (14-28.6) \\ * \\ (7.2-27) \\ (17.2-34.8) \\ (5.6-27.4) \\ (19.4-56.1) \\ (15.6-29.2) \\ (7.9-31.9) \end{array}$ | 0.103 | $\begin{array}{r} 23.9 \\ 22.0 \\ * \\ 7.8 \\ 19.5 \\ (4.7) \\ (11.3) \\ 11.7 \\ 7.5 \end{array}$ | $\begin{array}{r} (15.8-34.5) \\ (16.3-29.0) \\ * \\ (3.2-17.9) \\ (12.9-28.3) \\ (1.3-15.5) \\ (3.3-32.2) \\ (7.4-17.9) \\ (3.4-15.6) \end{array}$ | $<0.001$ |
| Total | 942 | 42.7 | (38.9-46.6) |  | 22.1 | (19.2-25.4) |  | 20.3 | (17.2-23.7) |  | 14.9 | (12.5-17.7) |  |

[^25]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\mathrm{a}}$ Among those who gave birth in last 5 years
${ }^{\mathrm{b}}$ Multiple options possible.
${ }^{\text {c }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card.
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
${ }^{8}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

Table 6.19: Use of Mosquito Net During Mosquito Season, Among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | During the mosquito season, child sleeps under a mosquito net |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Never |  |  | Sometimes |  |  | Always |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | 18.3 | (14.8-22.5) |  | 3.7 | (2.1-6.5) |  | 77.9 | (73.3-81.9) |  |
| Central | 355 | 14.1 | (10.6-18.5) |  | 9.3 | (6.5-13.2) |  | 76.6 | (71.4-81.1) |  |
| Western | 294 | 17.1 | (12.7-22.7) | $<0.001$ | 6.0 | (3.6-10.0) | 0.001 | 76.9 | (70.9-81.9) | <0.001 |
| Mid-western | 351 | 46.4 | (40.9-52.0) |  | 10.0 | (7.1-13.9) |  | 43.6 | (38.3-49.1) |  |
| Far-western | 377 | 56.9 | (51.7-61.9) |  | 3.2 | (1.8-5.7) |  | 39.9 | (35.0-45.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 64.0 | (57.5-70.0) |  | 8.2 | (5.2-12.8) |  | 27.8 | (22.3-34.0) |  |
| Hill | 707 | 39.9 | (35.8-44.1) | <0.001 | 10.9 | (8.4-14.2) | <0.001 | 49.2 | (44.9-53.6) | <0.001 |
| Terai | 727 | 5.9 | (4.2-8.3) |  | 3.6 | (2.3-5.7) |  | 90.5 | (87.6-92.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 15.2 | (10.0-22.4) | 0.001 | 6.1 | (2.7-13.0) | 0.630 | 78.7 | (70.6-85.1) | <0.001 |
| Rural | 1,482 | 25.8 | (23.5-28.3) | 0.001 | 7.1 | (5.7-8.9) | 0.630 | 67.0 | (64.3-69.7) | . 001 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 22.8 | (12.9-37.2) |  | 2.3 | (0.3-14.4) |  | 74.9 | (60.4-85.3) |  |
| 9-11 | 88 | 23.1 | (15.4-33.1) |  |  | (3.5-20.9) |  | 68.0 | (56.1-77.9) |  |
| 12-17 | 182 | 22.1 | (16.4-29.1) |  | 7.6 | (4.3-13.0) |  | 70.3 | (62.6-77.0) |  |
| 18-23 | 166 | 23.0 | (16.5-31.0) | 0.962 | 5.2 | (2.6-10.1) | 0.479 | 71.8 | (63.4-78.9) | 0.669 |
| 24-35 | 392 | 24.9 | (20.5-29.9) |  | 5.7 | (3.5-9.3) |  | 69.4 | (64.0-74.3) |  |
| 36-47 | 417 | 25.6 | (21.1-30.7) |  | 7.8 | (5.0-12.0) |  | 66.6 | (61.0-71.8) |  |
| 48-59 | 391 | 25.1 | (20.8-30.0) |  | 8.4 | (5.5-12.5) |  | 66.5 | (61.0-71.6) |  |
| 6-23 | 509 | 22.6 | (18.9-26.9) | 0.253 | 6.3 | (4.3-9.2) | 0.461 | 71.1 | (66.4-75.3) | 0.144 |
| 24-59 | 1,200 | 25.2 | (22.6-28.0) | 0.253 | 7.3 | (5.7-9.4) | 0.461 | 67.5 | (64.3-70.5) | 0.144 |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 23.5 | (20.5-26.8) | 0.343 | 7.9 | (5.9-10.5) | 0.122 | 68.6 | (64.9-72.1) | 0.974 |
| Female | 847 | 25.5 | (22.4-28.9) | 0.343 | 6.0 | (4.3-8.2) | 0.122 | 68.5 | (64.8-71.9) | 0.974 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 39.2 | (32.1-46.7) |  | 3.6 | (1.6-7.7) |  | 57.3 | (49.5-64.7) |  |
| Primary ${ }^{\text {b }}$ | 175 | 30.0 | (23.0-38.0) | <0.001 | 10.5 | (6.0-17.9) | 0.060 | 59.5 | (50.9-67.6) | 0.003 |
| Some secondary ${ }^{\text {c }}$ | 241 | 19.9 | (15.0-25.9) | <0.001 | 8.9 | (5.2-14.7) | 0.060 | 71.2 | (64.2-77.4) | 0.003 |
| SLC and above ${ }^{\text {d }}$ | 231 | 23.5 | (17.4-31.0) |  | 7.4 | (4.3-12.5) |  | 69.0 | (61.3-75.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 | 58.3 | (52.7-63.7) |  | 11.6 | (8.3-15.9) |  | 30.1 | (25.0-35.8) |  |
| Second | 353 | 24.9 | (20.3-30.2) |  | 6.6 | (4.3-10.0) |  | 68.5 | (62.8-73.7) |  |
| Middle | 301 | 8.2 | (5.5-12.0) | <0.001 | 5.3 | (3.0-9.0) | $<0.001$ | 86.6 | (81.8-90.2) | <0.001 |
| Fourth | 320 | 10.4 | (6.9-15.5) |  | 2.6 | (1.1-6.3) |  | 86.9 | (81.5-90.9) |  |
| Highest | 262 | 17.3 | (12.5-23.6) |  | 8.7 | (5.2-14.2) |  | 73.9 | (66.9-79.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | 23.3 | (16.6-31.6) |  | 3.5 | (1.3-8.6) |  | 73.3 | (64.7-80.4) |  |
| Hill Chhetri | 401 | 41.0 | (35.5-46.7) |  | 7.4 | (4.9-11.2) |  | 51.6 | (45.7-57.4) |  |
| Terai Brahmin/Chhetri | 42 | (14.7) | (4.5-38.4) |  | (3.4) | (0.8-13.3) |  | (81.9) | (60.0-93.1) |  |
| Other Terai Caste | 139 | 4.0 | (1.7-9.3) |  | 5.4 | (2.3-11.9) |  | 90.6 | (83.5-94.8) |  |
| Hill Dalit | 272 | 49.3 | (42.5-56.2) | <0.001 | 5.5 | (2.9-10.4) | 0.003 | 45.1 | (38.3-52.1) | <0.001 |
| Terai Dalit | 89 |  | (4.4-17.8) |  | 3.3 | (1.2-8.8) | 0.003 | 87.7 | (78.7-93.2) | <0.001 |
| Newar | 51 | 41.4 | (27.1-57.4) |  | 12.8 | (5.4-27.5) |  | 45.8 | (31.1-61.2) |  |
| Hill Janajati | 385 | 24.1 | (19.7-29.2) |  | 11.6 | (8.1-16.4) |  | 64.3 | (58.4-69.7) |  |
| Terai Janajati | 120 |  | (1.7-13.1) |  | 2.9 | (1.0-8.3) |  | 92.2 | (84.1-96.4) |  |
| Muslim | 50 | 10.7 | (4.8-22.3) |  | 8.8 | (3.8-18.8) |  | 80.6 | (67.8-89.1) |  |
| Total | 1,709 | 24.4 | (22.2-26.8) |  | 7.0 | (5.6-8.7) |  | 68.6 | (66.0-71.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Includes those who have never attended school. <br> ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. <br> ${ }^{\text {c I Includes those who have completed 6-9 years of school. }}$ <br> ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |

## CHAPTER 7

## Inflammation Status

Inflammation was assessed as it may be associated with nutritional status and influence the interpretation of biomarkers. Inflammation is commonly assessed as C-reactive protein (CRP) $\geq 5.0 \mathrm{mg} / \mathrm{L}$, which measures acute inflammation, and $\alpha-1$ acid glycoprotein (AGP) $\geq 1.0 \mathrm{~g} / \mathrm{L}$, which measures chronic inflammation (Suchdev et.al., 2016). This chapter provides the information on inflammation among children 6-59 months, adolescent boys 10-19 years, adolescent girls 10-19 years, non-pregnant and pregnant women 15-49 years.

### 7.1 Inflammation among Children 6-59 Months

Table 7.1 shows the prevalence of inflammation among children 6-59 months. The prevalence of elevated AGP (only) was 18 percent, and the prevalence of elevated CRP (only) was two percent. Nine percent had both elevated CRP and AGP. Elevated AGP (only) varied by ecological zone, wealth and ethnicity. Among children from the Mountain and Terai approximately 20 percent had elevated AGP (only) and 15 percent did so in the Hill. Elevated CRP (only) varied by age and wealth. By age, it ranged from eight percent among children 6-8 months to 0.3 percent among children 48-59 months. By wealth, elevated CRP (only) ranged from four percent for the second wealth quintile to less than one percent (0.5-0.6 percent) among children in the fourth and fifth quintiles. Having both elevated CRP and AGP varied by age and sex. It ranged from 17 percent among children 9-11 months to five percent among children 48-59 months. It was higher among males than females (10 percent versus seven percent).

### 7.2 Inflammation among Adolescent Boys 10-19 Years

Table 7.2 shows the prevalence of inflammation among adolescent boys 10-19 years. Among boys, the prevalence of elevated AGP (only) was three percent, and the prevalence of elevated CRP (only) was two percent. Nearly three percent of boys had both elevated CRP and AGP.

Over nine in ten adolescent boys 10-19 years (93 percent) had no inflammation. Those with no inflammation varied by developmental region, age, and ethnicity. Among development regions, no inflammation ranged from 96 percent in the Western region to 89 percent in the Eastern region. By age, no inflammation ranged from 95 percent among children 10-11 years to 88 percent among children 18-19 years. Among different ethnic caste group, no inflammation was 99 percent among the Hill Brahmin group and around 87 percent each among the Terai Brahmin/Chhetri, Hill Dalit, Newar, and Terai Janajati groups.

### 7.3 Inflammation among Adolescent Girls 10-19 Years

Table 7.3 shows the prevalence of inflammation among adolescent girls 10-19 years. The prevalence of elevated AGP (only) was four percent, and the prevalence of elevated CRP (only) was one percent. Nearly two percent of girls had both elevated CRP and AGP. Over nine in ten adolescent girls 10-19 years ( 93 percent) had no inflammation. Higher proportion of elevated AGP (only) varied by developmental region, ecological zone, age and ethnicity. By developmental region it ranged from seven percent in the Eastern region to two percent in the Western region. It was seven percent among girls in the Mountain and three percent in the Hill. By age, it ranged from seven percent among those 14-15 years to two percent among 18-19 years. It ranged from 13 percent among the Muslim caste and to around two percent among the Hill Chhetri, Terai Brahmin/Chhetri, and other Terai caste groups.

### 7.4 Inflammation among Non-Pregnant Women 15-49 Years

Table 7.4 shows the prevalence of inflammation among non-pregnant women $15-49$ years. The prevalence of elevated AGP (only) and elevated CRP (only) was four percent each. Two percent of non-pregnant women 15-49 years had both elevated CRP and AGP. Elevated AGP (only) varied among women by age and ranged from seven percent among those 15-19 years to around three percent for the other age groups. Elevated CRP (only) varied by developmental region and age. It ranged from five percent in the Central region to less than two percent in each of the Mid-western and Far-western regions. By age, it ranged from five percent among women 4049 years and less than one percent among those 15-19 years. Both elevated CRP and AGP varied by lactation status of women, ranging from 4 percent among lactating to less than one percent among non-lactating.

### 7.5 Inflammation among Pregnant Women 15-49 Years

Table 7.5 shows the prevalence of inflammation among pregnant women $15-49$ years. The prevalence of elevated AGP (only) was less than one percent ( 0.4 percent), and the prevalence of elevated CRP (only) was 13 percent. Two percent of pregnant women had both elevated CRP and AGP. Eighty-five percent of pregnant women had no inflammation. Elevated CRP (only) varied by trimester of pregnancy with 19 percent of those in the second trimester suffering from inflammation whereas 13 percent in the third trimester and three percent in the first trimester had inflammation.

## List of Tables

For more information on the Inflammation Status, see the following tables:
Table 7.1: Prevalence of Inflammation in Children 6-59 Months by Stage of Inflammation
Table 7.2: Prevalence of Inflammation in Adolescent Boys 10-19 Years by Stage of Inflammation
Table 7.3: Prevalence of Inflammation in Non-Pregnant Adolescent Girls 10-19 Years by Stage of Inflammation
Table 7.4: Prevalence of Inflammation in Non-Pregnant Women 15-49 Years by Stage of Inflammation
Table 7.5: Prevalence of Inflammation in Pregnant Women 15-49 Years by Stage of Inflammation

| Characteristics | N | No inflammation ${ }^{\mathrm{a}, \mathrm{b}}$(CRP $<5 \mathrm{mg} / \mathrm{L}$ and $\mathrm{AGP}<1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  | Elevated CRP only ${ }^{\text {a,b }}$(CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and AGP $<1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  | Elevated CRP and AGP ${ }^{\text {a,b }}$(CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  | Elevated AGP only $\mathrm{a}, \mathrm{b}$$(\mathrm{CRP}<5 \mathrm{mg} / \mathrm{L}$ and AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
|  | $\begin{aligned} & 323 \\ & 346 \\ & 277 \\ & 339 \\ & 366 \end{aligned}$ | $\begin{array}{r} 73.5 \\ 70.3 \\ 75.6 \\ 70.9 \\ 67.3 \\ \hline \end{array}$ | $\begin{aligned} & (68.0-78.4) \\ & (67.5-73.0) \\ & (68.4-81.6) \\ & (64.3-76.7) \\ & (61.7-72.5) \end{aligned}$ | 0.310 | $\begin{aligned} & 1.3 \\ & 1.5 \\ & 0.9 \\ & 3.4 \\ & 1.0 \end{aligned}$ | $\begin{aligned} & (0.5-3.5) \\ & (1.0-2.3) \\ & (0.3-2.9) \\ & (1.8-6.2) \\ & (0.5-2.3) \end{aligned}$ | 0.152 | $\begin{array}{r} 9.1 \\ 10.2 \\ 8.0 \\ 5.3 \\ 7.7 \end{array}$ | $\begin{array}{r} (6.2-13.0) \\ (7.4-13.8) \\ (4.5-13.8) \\ (3.6-7.7) \\ (5.1-11.5) \end{array}$ | 0.220 | $\begin{aligned} & 16.2 \\ & 17.9 \\ & 15.6 \\ & 20.4 \\ & 23.9 \end{aligned}$ | $\begin{aligned} & (11.9-21.6) \\ & (13.8-23.0) \\ & (11.7-20.5) \\ & (15.7-26.2) \\ & (19.1-29.4) \end{aligned}$ | 0.140 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 268 \\ & 685 \\ & 698 \end{aligned}$ | $\begin{aligned} & 67.8 \\ & 75.3 \\ & 69.4 \end{aligned}$ | $\begin{aligned} & (60.5-74.3) \\ & (72.2-78.1) \\ & (65.9-72.6) \end{aligned}$ | 0.024 | $\begin{aligned} & 1.9 \\ & 2.2 \\ & 1.0 \end{aligned}$ | $\begin{aligned} & (1.0-3.7) \\ & (1.5-3.2) \\ & (0.5-2.1) \end{aligned}$ | 0.151 | $\begin{array}{r} 10.2 \\ 7.6 \\ 9.2 \end{array}$ | $\begin{array}{r} (8.0-12.8) \\ (5.9-9.8) \\ (6.8-12.4) \end{array}$ | 0.472 | $\begin{aligned} & 20.1 \\ & 14.9 \\ & 20.5 \end{aligned}$ | $\begin{aligned} & (14.6-27.1) \\ & (13.0-17.0) \\ & (16.7-24.8) \end{aligned}$ | 0.014 |
| Location Urban <br> Rural | $\begin{array}{r} 211 \\ 1,440 \\ \hline \end{array}$ | $\begin{aligned} & 68.7 \\ & 72.1 \end{aligned}$ | $\begin{aligned} & (64.4-72.7) \\ & (69.8-74.4) \\ & \hline \end{aligned}$ | 0.310 | $\begin{aligned} & 1.2 \\ & 1.6 \\ & \hline \end{aligned}$ | $\begin{aligned} & (0.3-4.9) \\ & (1.2-2.3) \\ & \hline \end{aligned}$ | 0.809 | $\begin{array}{r} 11.3 \\ 8.2 \\ \hline \end{array}$ | $\begin{aligned} & (8.5-14.9) \\ & (6.6-10.3) \\ & \hline \end{aligned}$ | 0.120 | $\begin{array}{r} 18.8 \\ 18.0 \\ \hline \end{array}$ | $\begin{aligned} & (14.3-24.4) \\ & (15.6-20.7) \\ & \hline \end{aligned}$ | 0.798 |
| Age, months $6-8$ $9-11$ $12-17$ $18-23$ $24-35$ $36-47$ $48-59$ $6-23$ $24-59$ | 65 84 171 157 384 403 387 477 1,174 | $\begin{aligned} & 68.9 \\ & 56.7 \\ & 61.5 \\ & 71.3 \\ & 68.1 \\ & 74.4 \\ & 80.8 \\ & 65.0 \\ & 74.6 \\ & \hline \end{aligned}$ | $\begin{aligned} & (56.8-78.9) \\ & (45.6-67.1) \\ & (52.0-70.1) \\ & (63.7-77.9) \\ & (62.6-73.2) \\ & (69.9-78.4) \\ & (77.1-84.1) \\ & (59.8-69.8) \\ & (72.2-76.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & <0.001 \\ & <0.001 \end{aligned}$ | $\begin{aligned} & 8.0 \\ & 3.3 \\ & 0.5 \\ & 0.7 \\ & 2.2 \\ & 1.7 \\ & 0.3 \\ & 2.0 \\ & 1.4 \end{aligned}$ | $\begin{array}{r} (3.1-19.2) \\ (1.4-7.9) \\ (0.1-3.3) \\ (0.2-2.8) \\ (1.5-3.2) \\ (0.9-3.1) \\ (0.1-1.5) \\ (1.1-3.8) \\ (1.0-2.0) \\ \hline \end{array}$ | $\begin{gathered} <0.001 \\ \\ 0.333 \end{gathered}$ | 8.0 16.6 15.0 7.2 11.3 5.7 5.2 11.7 7.3 | $(3.4-17.8)$ $(9.0-28.6)$ $(10.0-21.9)$ $(4.1-12.4)$ $(8.2-15.4)$ $(3.5-9.1)$ $(3.1-8.5)$ $(9.2-14.9)$ $(5.7-9.3)$ | $\begin{gathered} <0.001 \\ \\ 0.003 \end{gathered}$ | $\begin{aligned} & 15.1 \\ & 23.4 \\ & 23.1 \\ & 20.7 \\ & 18.4 \\ & 18.2 \\ & 13.6 \\ & 21.3 \\ & 16.8 \end{aligned}$ | $\begin{array}{r} (8.4-25.4) \\ (15.5-33.9) \\ (16.5-31.3) \\ (15.8-26.8) \\ (14.1-23.7) \\ (15.0-22.0) \\ (10.1-18.1) \\ (17.3-25.9) \\ (14.4-19.4) \\ \hline \end{array}$ | 0.080 0.028 |
| Sex <br> Male <br> Female | $\begin{aligned} & 838 \\ & 813 \\ & \hline \end{aligned}$ | $\begin{aligned} & 70.2 \\ & 73.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & (67.0-73.1) \\ & (70.0-76.7) \\ & \hline \end{aligned}$ | 0.145 | $\begin{aligned} & 1.5 \\ & 1.6 \\ & \hline \end{aligned}$ | $\begin{aligned} & (0.9-2.5) \\ & (1.1-2.4) \\ & \hline \end{aligned}$ | 0.822 | $\begin{array}{r} 10.3 \\ 6.6 \\ \hline \end{array}$ | $\begin{array}{r} (8.0-13.1) \\ (4.8-9.0) \\ \hline \end{array}$ | 0.007 | $\begin{aligned} & 18.0 \\ & 18.2 \\ & \hline \end{aligned}$ | $\begin{aligned} & (15.1-21.3) \\ & (15.2-21.8) \\ & \hline \end{aligned}$ | 0.861 |
| Maternal Education <br> No education ${ }^{\text {c }}$ Primary ${ }^{\text {d }}$ Some secondary ${ }^{\text {e }}$ SLC and above ${ }^{f}$ | $\begin{aligned} & 222 \\ & 170 \\ & 238 \\ & 220 \end{aligned}$ | $\begin{array}{r} 71.5 \\ 68.2 \\ 77.3 \\ 73.4 \\ \hline \end{array}$ | $\begin{aligned} & (65.5-76.8) \\ & (61.0-74.6) \\ & (71.3-82.4) \\ & (66.8-79.2) \end{aligned}$ | 0.206 | $\begin{aligned} & 2.0 \\ & 2.6 \\ & 2.1 \\ & 1.3 \end{aligned}$ | $\begin{aligned} & (1.1-3.5) \\ & (1.2-5.4) \\ & (1.2-3.8) \\ & (0.5-3.0) \end{aligned}$ | 0.825 | $\begin{aligned} & 7.1 \\ & 7.9 \\ & 8.0 \\ & 6.6 \end{aligned}$ | $\begin{aligned} & (4.2-11.6) \\ & (4.6-13.4) \\ & (5.2-12.2) \\ & (3.8-11.0) \end{aligned}$ | 0.913 | $\begin{array}{r} 19.4 \\ 21.3 \\ 12.6 \\ 18.7 \\ \hline \end{array}$ | $\begin{array}{r} (15.0-24.9) \\ (15.6-28.3) \\ (8.7-18.0) \\ (13.4-25.6) \end{array}$ | 0.098 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 462 \\ & 342 \\ & 292 \\ & 304 \\ & 251 \end{aligned}$ | $\begin{aligned} & 66.4 \\ & 70.8 \\ & 69.9 \\ & 78.3 \\ & 73.5 \end{aligned}$ | $\begin{aligned} & (61.8-70.7) \\ & (64.4-76.5) \\ & (62.1-76.6) \\ & (72.6-83.0) \\ & (66.8-79.2) \end{aligned}$ | 0.010 | $\begin{aligned} & 1.9 \\ & 3.8 \\ & 1.2 \\ & 0.5 \\ & 0.6 \end{aligned}$ | $\begin{aligned} & (1.0-3.6) \\ & (2.6-5.3) \\ & (0.4-3.3) \\ & (0.1-1.5) \\ & (0.1-4.4) \end{aligned}$ | 0.008 | $\begin{array}{r} 9.0 \\ 11.2 \\ 6.6 \\ 8.7 \\ 7.5 \\ \hline \end{array}$ | $\begin{array}{r} (6.8-11.9) \\ (7.4-16.8) \\ (4.4-9.7) \\ (5.2-14.1) \\ (4.9-11.5) \\ \hline \end{array}$ | 0.283 | $\begin{aligned} & 22.7 \\ & 14.2 \\ & 22.4 \\ & 12.6 \\ & 18.4 \\ & \hline \end{aligned}$ | $\begin{array}{r} (18.6-27.4) \\ (11.2-17.8) \\ (15.7-30.9) \\ (9.2-17.0) \\ (14.3-23.3) \\ \hline \end{array}$ | 0.001 |

Table 7.1: Cont'd...


Table 7.2: Prevalence of Inflammation in Adolescent Boys 10-19 Years by Stage of Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No inflammation ${ }^{\text {a,b }}$ (CRP $<5 \mathrm{mg} / \mathrm{L}$ and AGP $<1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  | Elevated CRP only ${ }^{\text {a,b }}$ <br> (CRP $\geq 5 \mathrm{mg} / \mathrm{L}$ and AGP<1.0 g/L) |  |  | ```Elevated CRP and AGP \({ }^{\text {a,b }}\) (CRP \(\geq 5 \mathrm{mg} / \mathrm{L}\) and AGP \(\geq 1.0 \mathrm{~g} / \mathrm{L}\) )``` |  |  | $\begin{gathered} \text { Elevated AGP only }{ }^{\mathrm{a}, \mathrm{~b}} \\ \text { (CRP }<5 \mathrm{mg} / \mathrm{L} \text { and } \\ \text { AGP } \geq 1.0 \mathrm{~g} / \mathrm{L}) \\ \hline \end{gathered}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 207 | 89.1 | (79.5-94.5) |  | 2.0 | (0.6-6.9) |  | 4.3 | (1.8-9.8) |  | 4.5 | (2.0-10.2) |  |
| Central | 206 |  | (86.6-96.9) |  | 2.4 | (0.3-14.7) |  | 2.2 | (1.1-4.4) |  | 2.1 | (0.8-5.2) |  |
| Western | 193 | 96.4 | (92.2-98.4) | 0.029 | 1.1 | (0.3-3.6) | 0.396 | 1.3 | (0.3-5.6) | 0.340 | 1.2 | (0.2-8.5) | 0.058 |
| Mid-western | 196 | 94.8 | (91.6-96.8) |  | 0.3 | (0.0-2.0) |  | 2.6 | (1.1-5.7) |  | 2.3 | (1.2-4.4) |  |
| Far-western | 210 | 90.3 | (85.3-93.8) |  | 1.8 | (0.6--4.9) |  | 1.5 | (0.5-4.5) |  | 6.4 | (3.5-11.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 154 | 90.3 | (83.5-94.5) |  | 0.9 | (0.1-6.2) |  | 2.3 | (0.8-6.0) |  | 6.5 | (2.9-14.3) |  |
| Hill | 430 | 93.5 | (88.8-96.3) | 0.577 | 2.6 | (0.6-10.2) | 0.143 | 1.7 | (1.1-2.5) | 0.375 | 2.2 | (1.6-3.0) | 0.066 |
| Terai | 428 | 92.7 | (87.9-95.7) |  | 1.0 | (0.3-3.1) |  | 3.1 | (1.6-6.0) |  | 3.1 | (1.5-6.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 140 | 95.9 | (90.0-98.4) | 0.146 | 0.0 | - | 0.096 | 2.6 | (0.7-9.7) | 0.758 | 1.5 | (0.4-4.9) | 0.250 |
| Rural | 872 | 92.4 | (89.1-94.7) |  | 2.0 | (0.7-5.1) |  | 2.4 | (1.5-4.1) |  | 3.2 | (2.0-5.0) |  |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 202 | 95.3 | (92.7-97.0) |  | 0.0 | - |  | 2.2 | (1.3-3.6) |  | 2.5 | (1.2-5.2) |  |
| 12-13 | 263 | 94.2 | (89.0-97.0) |  | 0.3 | (0.1-1.2) |  | 1.2 | (0.2-6.2) |  | 4.3 | (2.0-9.1) |  |
| 14-15 | 234 | 91.6 | (83.5-95.9) | 0.046 | 3.9 | (1.3-10.9) | 0.001 | 2.2 | (0.8-6.1) | 0.239 | 2.3 | (0.8-6.6) | 0.622 |
| 16-17 | 165 | 94.1 | (89.3-96.9) |  | 0.6 | (0.2-2.7) |  | 3.0 | (1.1-7.8) |  | 2.3 | (1.0-5.0) |  |
| 18-19 | 148 | 88.2 | (78.1-94.0) |  | 4.0 | (1.2-12.8) |  | 4.6 | (1.3-14.8) |  | 3.2 | (0.9-10.4) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 7 | * | * |  | * | * |  | * | * |  | * | * |  |
| Primary ${ }^{\text {d }}$ | 318 | 94.5 | (90.9-96.8) | 0.349 | 0.5 | (0.1-2.5) | <0.001 | 0.8 | (0.3-2.2 | 0.010 | 4.2 | (2.2-7.8) | 0.159 |
| Some secondary ${ }^{\text {e }}$ | 544 | 92.4 | (88.6-95.0) | 0.349 | 1.0 | (0.3-2.9) | <0.001 | 4.0 | (2.3-6.9) | 0.010 | 2.6 | (1.4-4.9) | 0.159 |
| SLC and above ${ }^{\text {f }}$ | 143 | 91.3 | (76.4-97.2) |  | 6.7 | (1.6-24.0) |  | 1.0 | (0.2-4.0) |  | 1.0 | (0.1-7.3) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 248 | 89.6 | (86.2-92.3) |  | 1.2 | (0.3-4.1) |  | 2.4 | (1.4-3.9) |  | 6.8 | (4.7-9.8) |  |
| Second | 206 | 95.0 | (88.7-97.9) |  | 0.5 | (0.1-2.1) |  | 1.1 | (0.3-3.8) |  | 3.4 | (1.0-10.8) |  |
| Middle | 209 | 91.6 | (85.4-95.4) | 0.218 | 2.0 | (0.6-6.4) | 0.009 | 4.2 | (1.6-10.6) | 0.121 | 2.2 | (0.7-7.1) | 0.001 |
| Fourth | 163 | 93.5 | (86.7-97.0) |  | 0.0 | - |  | 3.6 | (1.4-9.2) |  | 2.9 | (0.8-9.5) |  |
| Highest | 186 | 94.4 | (81.4-98.5) |  | 4.3 | (0.8-19.4) |  | 1.1 | (0.2-7.7) |  | 0.2 | (0.0-1.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 135 | 99.4 | (95.7-99.9) |  | 0.0 | - |  | - | - |  | 0.6 | (0.1-4.3) |  |
| Hill Chhetri | 266 | 93.9 | (87.9-97.1) |  | 2.1 | (0.3-12.1) |  |  | (0.3-3.6) |  | 2.8 | (1.6-5.0) |  |
| Terai | 31 |  |  |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 31 | (87.5) | (69.8-95.5) |  | (0.0) |  |  | (12.5) | (4.5-30.2) |  | (0.0) |  |  |
| Other Terai caste | 70 | 92.7 | (83.8-96.9) |  | 0.0 | - |  | 3.2 | (0.8-12.4) |  | 4.1 | (1.2-12.6) |  |
| Hill Dalit | 116 | 87.2 | (75.8-93.7) | 0.007 | 3.6 | (1.6-8.2) | <0.001 | 1.6 | (0.4-6.1) | 0.001 | 7.6 | (2.6-20.6) | 0.022 |
| Terai Dalit | 38 | (94.7) | (75.8-99.0) |  | (3.8) | (0.4-26.6) |  | (0.5) | (0.1-4.1) |  | (1.0) | (0.1-7.3) |  |
| Newar | 37 | (86.7) | (65.6-95.7) |  | (12.1) | (3.4-35.0) |  | (1.2) | (0.2-7.9) |  | (0.0) | - |  |
| Hill Janajati | 209 | 93.9 | (91.5-95.7) |  | 0.8 | (0.2-3.7) |  |  | (1.5-4.7) |  | 2.6 | (1.6-4.1) |  |
| Terai Janajati | 88 | 87.4 | (64.0-96.4) |  | 0.5 | (0.1-3.8) |  |  | (1.0-21.1) |  | 7.2 | (2.4-19.9) |  |
| Muslim | 22 | * | * |  | * | * |  | * | * |  | * | * |  |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 155 | 96.3 | (92.0-98.3) |  | 1.3 | (0.3-5.8) |  | 0.5 | (0.1-3.7) |  | 1.9 | (0.7-5.1) |  |
| Negative | 857 | 92.3 | (89.0-94.7) | . 087 | 1.8 | (0.6-5.1) | 0.814 | 2.8 | (1.7-4.4) | 153 | 3.1 | (2.0-5.0) | 0.509 |
| $\begin{array}{\|l} \hline \begin{array}{l} \text { Dewormed in last } 6 \\ \text { months } \end{array} \\ \hline \end{array}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 621 | 92.8 | (88.3-95.7) |  | 2.5 | (0.7-8.3) |  | 1.6 | (0.7-3.3) |  | 3.1 | (2.0-4.9) | 0.680 |
| No | 391 | 92.9 | (88.1-95.9) |  | 0.8 | (0.3-2.2) | 0.050 | 3.5 | (1.8-6.6) | . 034 | 2.8 | (1.3-6.0) | 0.680 |
| Total | 1,012 | 92.9 | (89.9-95.0) |  | 1.7 | (0.6-4.5) |  | 2.5 | (1.6-3.9) |  | 3.0 | (1.9-4.6) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CRP, C-reactive protein; AGP, alpha-1-acid glycoprotein |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ ELISA |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Thurnham et al 2003 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {' Includes those who have never attended school. }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 7.3: Prevalence of Inflammation in Non-Pregnant Adolescent Girls 10-19 Years by Stage of Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | No inflammation ${ }^{\text {a,b }}$ (CRP $<5 \mathrm{mg} / \mathrm{L}$ and AGP<1.0 g/L) |  |  | $\begin{gathered} \text { Elevated CRP only }{ }^{\mathrm{a}, \mathrm{~b}} \\ (\mathrm{CRP} \geq 5 \mathrm{mg} / \mathrm{L} \text { and } \\ \text { AGP }<1.0 \mathrm{~g} / \mathrm{L}) \end{gathered}$ |  |  | Elevated CRP and AGP ${ }^{\text {a,b }}$ (CRP $\geq 5 \mathbf{m g} / \mathrm{L}$ and $A G P \geq 1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  | Elevated AGP only ${ }^{\text {a,b }}$ <br> (CRP $<5 \mathrm{mg} / \mathrm{L}$ and AGP $\geq 1.0 \mathrm{~g} / \mathrm{L}$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 351 | 90.5 | (83.5-94.8) |  | 1.5 | (0.6-4.0) |  | 1.1 | (0.5-2.2) |  | 6.8 | (3.3-13.7) |  |
| Central | 352 | 92.6 | (89.7-94.7) |  | 1.9 | (0.8-4.3) |  | 2.1 | (1.3-3.4) |  | 3.4 | (2.1-5.3) |  |
| Western | 347 | 96.8 | (94.9-98.0) | 0.016 | 0.4 | (0.0-2.7) | 0.042 | 0.8 | (0.3-2.6) | 0.410 | 2.0 | (1.2-3.5) | 0.011 |
| Mid-western | 379 | 92.3 | (87.4-95.5) |  | 0.6 | (0.2-1.7) |  | 2.2 | (1.0-4.9) |  | 4.9 | (2.8-8.4) |  |
| Far-western | 411 | 93.0 | (89.3-95.4) |  | 0.2 | (0.0-1.5) |  | 1.9 | (1.0-3.5) |  | 4.9 | (2.9-8.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 288 | 87.3 | (81.5-91.4) |  | 2.3 | (0.8-6.6) |  | 3.5 | (1.6-7.2) |  | 6.9 | (4.6-10.4) |  |
| Hill | 774 | 94.8 | (93.0-96.1) | 0.004 | 0.7 | (0.4-1.2) | 0.246 | 1.5 | (1.0-2.3) | 0.170 | 2.9 | (1.9-4.5) | 0.041 |
| Terai | 778 | 92.3 | (88.9-94.7) |  | 1.3 | (0.5-3.2) |  | 1.4 | (0.8-2.4) |  | 5.0 | (3.1-8.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 212 | 91.2 | (87.7-93.7) | . 353 | 1.4 | (0.7-2.8) | 0.520 | 1.4 | (0.4-5.3) | 0.987 | 6.0 | (4.0-9.0) | . 222 |
| Rural | 1,628 | 93.2 | (91.2-94.8) |  | 1.1 | (0.6-2.1) |  | 1.6 | (1.1-2.3) |  | 4.1 | (2.9-5.7) |  |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 341 | 91.1 | (86.8-94.1) |  | 2.5 | (1.0-5.9) |  | 1.5 | (0.7-3.2) |  | 4.9 | (2.9-8.0) |  |
| 12-13 | 445 | 93.1 | (90.0-95.3) |  | 1.0 | (0.4-2.6) |  | 2.0 | (1.0-4.0) |  | 3.9 | (2.2-6.6) |  |
| 14-15 | 402 | 91.3 | (85.9-94.7) | 0.100 | 0.9 | (0.3-2.9) | 0.140 | 1.3 | (0.5-3.4) | 0.704 | 6.5 | (3.4-12.0) | 0.028 |
| 16-17 | 319 | 94.4 | (90.9-96.7) |  | 1.1 | (0.3-4.) |  | 0.9 | (0.2-3.3) |  | 3.6 | (1.8-7.2) |  |
| 18-19 | 333 | 95.6 | (93.6-97.0) |  | 0.3 | (0.1-1.2) |  | 2.2 | (1.3-3.7) |  | 1.9 | (1.1-3.2) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 78 | 89.9 | (81.8-94.7) |  | 0.0 | - |  | 4.4 | (2.7-7.1) |  | 5.6 | (2.0-15.0) |  |
| No | 6 |  | * |  | * | * |  | * | * |  | * | * |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 54 | 92.0 | (83.3-96.4) |  | 0.5 | (0.1-3.7) |  | 3.3 | (0.7-14.3) |  | 4.1 | (1.0-16.0) |  |
| Primary ${ }^{\text {d }}$ | 536 | 91.6 | (88.8-93.7) | 0.313 | 1.8 | (0.8-3.7) | 0.175 | 1.5 | (0.8-3.0) | 0.502 | 5.1 | (3.5-7.2) | 0.539 |
| Some secondary ${ }^{\text {e }}$ | 990 | 93.4 | (91.0-95.1) |  | 0.7 | (0.3-1.7) |  | 1.7 | (1.1-2.5) |  | 4.2 | (2.7-6.6) |  |
| SLC and above ${ }^{\text {f }}$ | 259 | 94.7 | (90.6-97.1) |  | 1.4 | (0.4-4.7) |  | 1.1 | (0.4-2.9) |  | 2.8 | (1.2-6.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 490 | 91.3 | (88.3-93.6) |  | 1.8 | (0.8-4.0) |  | 1.3 | (0.6-2.7) |  | 5.6 | (4.0-7.7) |  |
| Second | 424 | 94.8 | (92.3-96.6) |  | 0.4 | (0.1-1.1) |  | 1.2 | (0.6-2.5) |  | 3.6 | (2.2-5.9) |  |
| Middle | 335 | 93.0 | (88.3-95.9) | 0.021 | 0.7 | (0.2-2.5) | 0.003 | 2.5 | (1.3-4.7) | 0.307 | 3.8 | (1.4-9.6) | 0.503 |
| Fourth | 320 | 95.4 | (92.0-97.4) |  | 0.2 | (0.0-1.2) |  | 1.0 | (0.4-2.3) |  | 3.4 | (1.6-6.8) |  |
| Highest | 271 | 89.9 | (84.8-93.4) |  | 2.9 | (1.0-7.9) |  | 2.4 | (1.4-4.1) |  | 4.8 | (2.4-9.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 218 | 90.1 | (84.0-94.1) |  | 1.8 | (0.6-5.0) |  | 2.4 | (1.1-5.3) |  | 5.6 | (2.8-10.9) |  |
| Hill Chhetri | 440 | 95.6 | (93.7-97.0) |  | 0.4 | (0.1-1.2) |  | 1.7 | (1.0-2.7) |  | 2.3 | (1.4-3.9) |  |
| Terai | 43 | (93.7) | (77.8-98.4) |  | (0.0) | - |  | (4.0) | (0.7-19.8) |  | (2.4) | (0.3-16.6) |  |
| Brahmin/Chhetri | 124 | 93.9 | (85.7-97.5) |  | 1.6 | (0.3-7.9) |  | 2.1 | (0.5-8.4) |  | 2.5 | (0.9-6.8) |  |
| Hill Dalit | 231 | 94.0 | (89.3-96.7) | 0.179 | 0.0 | - | 0.176 | 1.0 | (0.3-3.4) | 0.654 | 4.9 | (0.7-8.9) | 0.001 |
| Terai Dalit | 90 | 89.7 | (65.7-97.5) |  | 0.0 | - |  | 0.5 | (0.1-3.9) |  | 9.8 | (2.2-34.4) |  |
| Newar | 58 | 92.3 | (79.3-97.4) |  | 2.0 | (0.3-11.9) |  | 0.0 | - |  | 5.7 | (1.4-20.4) |  |
| Hill Janajati | 414 | 92.7 | (89.5-95.0) |  | 2.2 | (1.1-4.2) |  | 2.0 | (1.2-3.1) |  | 3.2 | (2.0-5.0) |  |
| Terai Janajati | 185 | 94.3 | (89.3-97.0) |  | 0.8 | (0.1-5.2) |  | 0.7 | (0.1-5.2) |  | 4.2 | (1.8-9.3) |  |
| Muslim | 37 | (87.0) | (71.5-94.7) |  | (0.0) | - |  | (0.0) | - |  | (13.0) | (5.3-28.5) |  |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 292 | 94.9 | (91.7-96.9) |  | 0.2 | (0.0-1.5) |  | 0.4 | (0.1-1.7) | 064 | 4.5 | (2.6-7.6) | 779 |
| Negative | 1,517 | 92.7 | (90.7-94.2) | 187 | 1.3 | (0.8-2.4) | , 59 | 1.9 | (1.3-2.6) | . 064 | 4.2 | (3.0-5.7) | 0.779 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 1,132 | 93.0 | (90.1-95.1) | 0.938 | 0.8 | (0.4-1.7) | 0.144 | 1.2 | (0.6-2.1) | 0.122 | 5.0 | (3.2-7.7) | 0.087 |
| No | 708 | 93.0 | (90.9-94.6) |  | 1.5 | (0.8-3.0) |  | 2.1 | (1.6-2.9) |  | 3.4 | (2.3-4.9) |  |
| Total | 1,840 | 93.0 | (91.2-94.4) |  | 1.1 | (0.6-2.0) |  | 1.6 | (1.2-2.2) |  | 4.3 | (3.1-5.8) |  |

[^26]Table 7.4: Prevalence of Inflammation in Non-Pregnant Women 15-49 Years by Stage of Inflammation, Nepal National Micronutrient Status Survey, 2016


Table 7.5: Prevalence of Inflammation in Pregnant Women 15-49 Years by Stage of Inflammation, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed
Sample size for pregnant women designed to be only nationally representative.
Sample size might vary slightly due to missing data.
CRP, C-reactive protein; AGP, alpha-1-acid glycoprotein
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ ELISA
${ }^{\text {b }}$ Thurnham et.al. 2003
${ }^{\text {}}$ Includes those who have never attended school.
${ }^{\text {d }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {e }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {f I Includes those who }}$ who completed 10 and more years of school. SLC: School Leaving Certificate.

## CHAPTER 8

## Morbidity and Infectious Disease

This chapter presents findings on the respondent's report of the prevalence and treatment of some common diseases (diarrhea, respiratory infections, and fever) in the two weeks prior to the interview. Also, it describes Helicobacter pylori, Visceral Lesmeniasis and soil transmitted helminths infections among various population groups. Although malaria was assessed as part of this survey for selected population groups (children 6-59 months, adolescent boys 10-19 years, adolescent girls 10-19 years, non-pregnant women and pregnant women 15-49 years), there were no malaria cases identified among participants and no further malaria data are included in this report.

### 8.1 Fever, Cough and Diarrhea among Children 6-59 Months

Table 8.1 presents the percentage of fever, cough and diarrhea among children 6-59 months in the two weeks prior to the interview as reported by their mother/caregivers. A similar percent of children 6-59 months had cough ( 38 percent) and fever ( 37 percent), while 20 percent had diarrhea. Fever varied by urban/rural location, child age, maternal education and ethnicity. It was more prevalent among children in urban areas than rural areas ( 45 percent versus 35 percent). By age, it ranged from 59 percent among those age 6-8 months to 26 percent among those $48-59$ months. By maternal education, it ranged from 42 percent among those with mothers achieving a primary education to 29 percent among those achieving some secondary education. By ethnic caste group, fever was 48 percent among the Terai Dalit caste group and 32 percent each among the Hill Chhetri and Hill Janajati groups.

Cough in the past two weeks varied by developmental region, ecological zone, age and ethnicity. It ranged from 45 percent among children in the Eastern region to 34 percent among children in the Far Western region. In the Mountain and Terai more than 40 percent of children
had a cough, while 33 percent of children in the Hill did so in the prior two weeks. By age, cough prevalence ranged from 49 percent among children age 6-8 months to 30 percent among those 48-59 months. By ethnic caste groups, cough prevalence ranged from 54 percent of children in the Terai Dalit group to 30 percent of children in the Terai Brahmin/Chhetri group. Diarrhea also varied by ecological zone, age and ethnic caste group. By ecological zone it ranged from 27 percent in the Mountain to 16 percent in the Hill. By age, diarrhea ranged from 34 percent among children age 9-11 months to 13 percent among those $48-59$ months. By ethnic caste group, it was 36 percent among children in the Muslim caste group and 12 percent among children in the Hill Brahmin group.

Mother's whose children had diarrhea in the two weeks prior to the interview were further asked about the treatment of diarrhea given as given in Table 8.2. Among the children who had diarrhea, over four in ten ( 42 percent) were not given any treatment, while over a quarter ( 27 percent) had received oral rehydration solution (ORS). Seven percent of the children were given zinc supplements, and 13 percent were treated with antibiotics and anti-diarrheal. Eight percent of children received other home remedies. Those who did not give any treatment varied by maternal education, which ranged from 63 percent not giving treatment among those with no education to 24 percent among those with a primary education. Use of ORS varied by urban/rural location and child age. Compared to children in urban areas more children in rural areas received ORS ( 15 percent versus 29 percent). By child age, ORS treatment was 41 percent among children 24-35 months and 16 percent among children 18-23 months. Treatment with zinc varied by developmental and ecological regions. It ranged from 19 and 16 percent, respectively, in the Far-western and Mid-western regions to 2 percent among the Central region. By ecological zone, zinc treatment was 22 percent in the Mountain and four percent in the Terai. Antibiotic treatment varied by ecological zone and wealth quintile. It ranged from 17 percent in the Terai to two percent in the Mountain. By wealth, it was 25 percent among the highest wealth quintile and four percent among the lowest. Anti-diarrheal treatment varied by developmental region and was greater than 21 percent in both the Mid-western and Western regions and two percent or less in the Eastern and Far-western regions. Home remedies use varied by wealth and ranged from 16 percent among the lowest wealth quintile to two percent among the second lowest wealth quintile (Table 8.2).

### 8.2 Fever, Cough and Diarrhea among Children 6-9 Years

Among children 6-9 years, a similar percent of children 6-9 years had fever (17 percent) and cough ( 16 percent), while six percent had diarrhea in the two weeks prior to the survey (Table 8.3). Fever varied by ecological zone, gender, and wealth quintile. Fever ranged from 25 percent in the Mountain to 13 percent in the Terai. It was higher in males than females ( 20 percent versus 13 percent). By wealth quintile, it ranged from 25 percent among the second wealth quintile to 11 percent among the fourth wealth quintile. Cough varied by age, wealth and ethnicity. By age, it ranged from 21 percent among children age 8 years to 10 percent among those 7 years. By wealth, it ranged from 24 percent among those in the second wealth quintile group and 11 percent among those in the highest group. By ethnic caste groups, it was 24 percent among the Terai Brahmins and 10 percent among the Muslims. Diarrhea varied by urban/rural location and education. It was seven percent in rural areas compared to two percent in urban areas. Among children with no education the prevalence of diarrhea was 24 percent and it was six percent among those with some primary education.

# 8.3 Fever, Cough and Diarrhea among Adolescent Boys 10-19 Years 

Among adolescent boys 10-19 years, a similar percent of boys had cough (12 percent) and fever (11 percent), while seven percent had diarrhea in the two weeks prior to the survey (Table 8.4). Fever varied by developmental region and age. It ranged from 17 percent among boys in the Eastern region to five percent among those in the Western region. By age, fever ranged from 16 percent among boys 10-11 years to seven percent among those 16-17 years. Cough varied by ecological zone and ethnic caste group. It was 27 percent among boys in the Mountain and around 11 percent in each of the Hill and Terai regions. Diarrhea varied by developmental region, ecological zone, age and ethnic caste group. By developmental zone, diarrhea ranged from 11 percent in the Eastern region to five percent in the Central region. Diarrhea was nine percent or higher in the Mountain and Terai and four percent in the Hill. By age, prevalence of diarrhea ranged from 11 percent among boys 12-13 years and four percent each among those 10-11 years and 16-17 years. By ethnic caste group, diarrhea was 15 percent among the Terai Janajati caste group and four percent among the Hill Brahmin.

### 8.4 Fever, Cough and Diarrhea among Adolescent Girls 10-19 Years

Among adolescent girls 10-19 years, a similar percent of girls had cough (18 percent) and fever (15 percent), while nine percent had diarrhea in the two weeks prior to the survey (Table 8.5). Fever varied by most characteristics. It was 16 percent or great in all regions except the Western region (10 percent). It ranged from 24 percent in the Mountain to 14 percent in the Terai. Fever was more prevalent in rural areas compared to urban areas (16 percent versus 10 percent). By education, it ranged from 21 percent among girls with some primary education to 10 percent among girls with an education of SLC or higher. By wealth, fever was 22 percent among girls in the second wealth quintile and 10 percent among girls in the highest quintile. Fever ranged from 23 percent among girls in the Terai Dalit caste group to eight percent among girls in the Terai Janajati group. Cough varied by ecological zone and wealth quintile. The prevalence was 30 percent in the Mountain and 16 percent in the Terai. By wealth quintile, it was 23 percent among girls in the lowest wealth quintile and 13 percent among girls in the highest quintile. Diarrhea was higher among girls in rural areas compared to urban areas (nine percent versus three percent). Diarrhea ranged from 16 percent in the Terai Dalit caste group to six percent among the Hill Chhetri caste group.

### 8.5 Fever, Cough and Diarrhea among Non-Pregnant Women 15-49 Years

Among non-pregnant women 15-49 years, a similar percent of non-pregnant women had cough (15 percent) and fever (14 percent), while nine percent had diarrhea in the two weeks prior to the survey (Table 8.6). Fever and cough varied by most characteristics. By developmental region, fever ranged from 20 percent among women in the Far-western region to 11 percent among women in the Western region. By ecological zone, fever ranged from 25 percent among women in the Mountain region to 11 percent among women in the Terai. It was higher among
women in rural areas than urban areas (14 percent versus 10 percent). By age, fever ranged from 19 percent among women 15-19 years to 10 percent among women 40-49 years. By wealth quintile, fever was 19 percent each among women in the lowest and second lowest wealth groups and nine percent among women in the highest wealth group. The prevalence of cough ranged from 20 percent among women in the Mid-western region to 12 percent among women in the Central region. In the Mountain, cough prevalence was 21 percent while it was 16 percent in the Hill and 13 percent in the Terai. Cough ranged from 20 percent among women with a primary education to 10 percent among those with the highest levels of education. Diarrhea varied only be wealth quintile; it ranged from 12 percent among the second lowest wealth quintile to six percent among the highest wealth quintile.

### 8.6 Fever, Cough and Diarrhea among Pregnant Women 15-49 Years

Among pregnant women 15-49 years, 16 percent had fever, 21 percent had cough while six percent had diarrhea in the two weeks prior to the survey (Table 8.7). Because of the small sample size, all stratification results in Table 8.7 should be interpreted with caution.

### 8.7 Helicobacter Pylori Infection among Children 6-59 Months

Table 8.8 presents the prevalence of Helicobacter Pylori (H. pylori) assessed in a stool sample among children 6-59 months. Overall, one in five children ( 20 percent) had H. pylori infection. The H. pylori infection ranged from 15 percent in the Western region to 26 percent in the Eastern region. Older children 48 to 59 months had a 26 percent prevalence of H. pylori infection while it was 10 percent among younger children 6-23 months. Among those with low education or lower wealth, about $1 / 5$ children had H. Pylori infection. By caste group, H. pylori infection prevalence ranged from 12 percent among the Hill Chhetri to 26 percent among the Terai Dalit.

### 8.8 Helicobacter Pylori Infection Adolescent Boys 10-19 Years

H. pylori infection among adolescent boys 10-19 years was assessed from a blood sample using a rapid test kit. Nationally, 14 percent of adolescent boys had H. pylori infection, with a prevalence of 21 percent among boys in the Mid-western region and nine percent among boys in the Western region. Older adolescent boys 18-19 years had a prevalence of 21 percent while their younger counterparts of 10-11 years had a prevalence of eight percent. By level of education, nine percent of adolescents with a primary level of education had H . pylori infection and 21 percent were infected among those with a SLC and higher level of education (Table 8.9).

### 8.9 Helicobacter Pylori Infection Non-Pregnant Adolescent Girls 10-19 Years

H. pylori infection among non-pregnant adolescent girls 10-19 years was also assessed from a blood sample using a rapid test kit. A total of 16 percent of adolescent girls had H. pylori infection, with a 22 percent prevalence among girls in the Mid-western region and 12 percent prevalence among girls in the Western region. Similar to adolescent boys, older adolescent girls 18-19 years had higher levels of infection ( 24 percent) than their youngest counterparts (14 percent among girls 10-11 years and 11 percent among girls 12-13 years). The prevalence by ethnic caste ranged from 25 percent among the Muslim caste group to 6 percent among the Terai Brahmin/Chhetri (Table 8.10).

### 8.10 Helicobacter Pylori Infection Non-Pregnant Women 15-49 Years

Table 8.11 shows that four in ten non-pregnant women 15-49 years ( 40 percent) had H. pylori infection that was assessed from a stool sample. The prevalence of H. pylori infection was close to 50 percent among non-pregnant women in the Mid-western region, the Far-western region and the Eastern region. H. pylori infection varied by education level where the prevalence ranged from 47 percent among women with a primary level of education to 34 percent among women with an education of SLC and higher level. Further, 57 percent of women 15-49 years from the Terai Janajati caste group had H. pylori infection.

### 8.11 Visceral Leishmaniasis among Children 6-59 Months, and Non-Pregnant Women 15-49 Years

Children 6-59 months and non-pregnant women of reproductive age 15-49 years were tested for visceral leishmaniasis using a rapid diagnostic test kit. Among 1,649 children tested for visceral leishmaniasis, 3 ( 0.1 percent) of them tested positive for infection. Among 2,136 nonpregnant women tested for visceral leishmaniasis, 7 ( 0.4 percent) tested positive (Table 8.12).

### 8.12 Soil Transmitted Helminths among Children 6-59 Months

Table 8.13 and 8.14 shows the prevalence of any soil transmitted helminths infection, and particularly by ascaris lumbricoides, trichuris trichura and hookworm among children 6-59 months. Kato-katz technique was adopted to assess the type and intensity of worm infestation and the results are in Table 8.14. Overall, 12 percent of children 6-59 months had any worm infestation (Table 8.13), with 11 percent having light intensity of ascaris lumbricoides and around one percent each having light intensity of trichuris trichura and light intensity of hookworm (Table 8.14). There were no cases of moderate intensity of any of worm infestations in children 6-59 months with the exception of one case of moderate intensity of ascaris infestation (data not shown). The infestation of any soil transmitted helminth varied by developmental region and ranged from 16 percent in the Far-western region to eight percent in
the Eastern region. It also varied by ethnic caste group and ranged from 19 percent each among the Terai Dalit, Newar and Muslim caste groups and seven percent among the Hill Dalit.

### 8.13 Soil Transmitted Helminths among Non-Pregnant Women 15-49 Years

Table 8.15 and 8.16 shows the prevalence of any soil transmitted helminths infections, and particularly by ascaris lumbricoides, trichuris trichura and hookworm among non-pregnant women 15-49 years. Kato-katz technique was adopted to measure the type and intensity of worm infestation and the results are shown in Table 8.16. Almost one in five (19 percent) nonpregnant women $15-49$ years had worm infestation with 18 percent having light intensity of ascaris lumbricoides, 0.1 percent having light intensity of trichuris trichura, while 0.9 percent having light intensity of hookworm. There were no cases of moderate or heavy intensity infection of any soil transmitted helminths. The range of any worm infestation was 23 percent among non-pregnant women in the Far-western region and eight percent among women in the Eastern region. Further it ranged from 34 percent among women in the Muslim caste group to around nine percent among women in the Terai Brahmin/Chhetri and Terai Janajati groups. Infection was higher among women who had not consumed a deworming tablet during six months prior to the survey ( 20 percent vs 16 percent).

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Table 8.1: Recent Morbidity during the Last Two Weeks among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | 40.3 | (35.0-45.9) |  | 45.1 | (40.8-49.5) |  |  | (15.7-24.0) |  |
| Central | 355 | 36.2 | (30.1-42.8) |  | 38.1 | (32.4-44.3) |  | 20.6 | (16.7-25.2) |  |
| Western | 294 | 31.9 | (26.8-37.4) | 0.124 | 35.1 | (31.2-39.2) | 0.031 | 18.7 | (13.4-25.3) | 0.112 |
| Mid-western | 351 | 39.9 | (34.5-45.7) |  | 35.3 | (30.9-39.9) |  |  | (19.3-27.5) |  |
| Far-western | 377 | 33.2 | (29.1-37.5) |  | 34.3 | (28.9-40.1) |  | 12.8 | (10.1-16.2) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 275 | 40.2 | (35.2-45.4) |  | 40.8 | (31.4-50.9) |  | 27.2 | (23.5-31.2) |  |
| Hill | 707 | 33.9 | (30.1-37.8) | 0.137 | 33.2 | (30.0-36.6) | 0.001 | 15.5 | (13.0-18.3) | <0.001 |
| Terai | 727 | 38.2 | (33.5-43.1) |  | 42.1 | (38.0-46.3) |  | 21.8 | (18.4-25.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 227 | 44.8 | (35.3-54.6) | 0.006 | 42.4 | (36.7-48.4) | 0175 |  | (11.2-31.1) | 0.897 |
| Rural | 1,482 | 35.3 | (32.6-38.1) | 0.006 | 37.7 | (34.8-40.7) | 0.175 | 19.7 | (17.6-21.9) | 0.897 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 73 | 59.4 | (45.0-72.4) |  | 48.7 | (36.4-61.2) |  | 26.6 | (16.5-39.9) |  |
| 9-11 | 88 | 44.4 | (33.8-55.7) |  | 40.5 | (30.0-51.9) |  | 34.0 | (24.3-45.3) |  |
| 12-17 | 182 | 40.6 | (32.6-49.2) |  | 38.6 | (32.1-45.4) |  | 24.6 | (18.5-31.8) |  |
| 18-23 | 166 | 40.5 | (30.9-50.7) | <0.001 | 44.0 | (34.4-54.1) | 0.005 | 19.7 | (13.3-28.1) | $<0.001$ |
| 24-35 | 392 | 37.3 | (31.9-43.0) |  | 42.1 | (37.3-47.1) |  | 21.7 | (17.6-26.4) |  |
| 36-47 | 417 | 36.5 | (31.6-41.6) |  | 37.7 | (32.7-42.9) |  | 17.6 | (13.7-22.3) |  |
| 48-59 | 391 | 26.4 | (22.1-31.3) |  | 30.4 | (25.4-35.9) |  | 13.0 | (9.8-17.0) |  |
| 6-23 | 509 | 43.8 | (38.8-48.9) | <0.00 | 42.1 | (36.8-47.6) | 0.036 | 24.7 | (20.9-29.0) | <0.001 |
| 24-59 | 1,200 | 33.4 | (30.6-36.3) | <0.001 | 36.7 | (33.7-39.7) | 0.036 | 17.4 | (15.0-20.1) | 0.001 |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 862 | 37.6 | (33.6-41.7) | 0.340 | 39.8 | (36.3-43.4) | 0.182 |  | (15.4-21.7) | 0.165 |
| Female | 847 | 35.3 | (31.9-39.0) | 0.340 | 36.6 | (33.3-40.1) | 0.182 | 21.0 | (18.5-23.9) | 0.165 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | 36.4 | (28.9-44.7) |  | 37.6 | (30.3-45.4) |  |  | (12.5-22.9) |  |
| Primary ${ }^{\text {b }}$ | 175 | 42.1 | (34.5-50.0) | . 041 | 39.8 | (31.2-49.0) | 0.459 | 19.7 | (13.9-27.1) | 0.853 |
| Some secondary ${ }^{\text {c }}$ | 241 | 28.6 | (23.0-34.8) | . 041 | 37.5 | (32.5-42.7) | 0.459 | 18.9 | (14.3-24.6) | 0.853 |
| SLC and above ${ }^{\text {d }}$ | 231 | 34.6 | (26.6-43.7) |  | 32.5 | (26.1-39.5) |  | 17.0 | (12.5-22.6) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 473 | 39.0 | (35.2-42.9) |  | 37.5 | (32.3-43.0) |  |  | (19.5-25.1) |  |
| Second | 353 | 39.1 | (33.7-44.6) |  | 38.0 | (32.4-43.9) |  | 19.1 | (14.4-24.7) |  |
| Middle | 301 | 33.0 | (26.1-40.8) | 0.279 | 40.9 | (34.5-47.5) | 0.263 | 23.0 | (18.1-28.8) | 0.086 |
| Fourth | 320 | 33.8 | (27.5-40.7) |  | 34.1 | (28.2-40.4) |  | 18.1 | (13.3-24.1) |  |
| Highest | 262 | 37.8 | (28.6-47.9) |  | 41.5 | (32.5-51.1) |  | 15.5 | (10.7-21.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | 35.5 | (27.9-43.9) |  | 37.7 | (29.6-46.5) |  | 12.0 | (7.0-19.9) |  |
| Hill Chhetri | 401 | 31.7 | (27.3-36.5) |  | 33.7 | (28.6-39.1) |  | 17.5 | (14.0-21.7) |  |
| Terai Brahmin/ Chhetri | 42 | (33.3) | (17.4-54.2) |  | (29.9) | (15.5-49.8) |  | (18.5) | (9.8-32.2) |  |
| Other Terai caste | 139 | 39.4 | (32.0-47.3) |  | 41.1 | (30.8-52.3) |  | 20.5 | (19.5-26.1) |  |
| Hill Dalit | 272 | 41.8 | (36.2-47.6) | 0.041 | 41.5 | (35.2-48.0) | 0.004 | 21.3 | (15.6-28.5) | 0.002 |
| Terai Dalit | 89 | 48.3 | (36.2-60.6) | 0.041 | 54.1 | (43.8-64.0) | 0.004 | 29.8 | (21.9-39.1) | 0.002 |
| Newar | 51 | 39.2 | (24.6-56.1) |  | 39.4 | (24.7-56.2) |  | 20.5 | (9.7-38.3) |  |
| Hill Janajati | 385 | 32.1 | (27.4-37.3) |  | 33.2 | (28.3-38.5) |  |  | (14.2-20.0) |  |
| Terai Janajati | 120 | 40.5 | (30.0-52.0) |  | 45.1 | (36.6-54.0) |  | 20.9 | (14.4-29.3) |  |
| Muslim | 50 | 33.4 | (22.6-46.2) |  | 37.1 | (24.6-51.6) |  | 36.2 | (14.9-64.8) |  |
| Total | 1,709 | 36.5 | (33.6-39.6) |  | 38.3 | (35.7-41.0) |  | 19.6 | (17.5-21.9) |  |

[^27]| Characteristics | N | Did not give treatment |  |  | Treatment given to child for diarrhea |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | ORS |  |  | nc Supplem |  |  | Antibiotics |  |  | Anti-diarrhea |  |  | Home remed |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 58 \\ & 77 \\ & 55 \\ & 89 \\ & 49 \\ & \hline \end{aligned}$ | $\begin{array}{r} 49.5 \\ 47.5 \\ 30.8 \\ 35.5 \\ (36.5) \end{array}$ | $\begin{aligned} & (36.3-62.7) \\ & (39.4-55.7) \\ & (21.0-42.7) \\ & (23.6-49.6) \\ & (23.6-51.6) \\ & \hline \end{aligned}$ | 0.106 | $\begin{array}{r} 35.2 \\ 21.0 \\ 24.5 \\ 32.3 \\ (34.5) \\ \hline \end{array}$ | $\begin{aligned} & (24.1-48.1) \\ & (13.5-31.2) \\ & (12.0-43.5) \\ & (23.8-42.2) \\ & (22.3-49.1) \\ & \hline \end{aligned}$ | 0.176 | $\begin{array}{r} 5.3 \\ 2.1 \\ 5.9 \\ 16.0 \\ (18.8) \\ \hline \end{array}$ | $\begin{array}{r} (1.6-16.3) \\ (1.6-2.8) \\ (1.9-17.1) \\ (10.7-23.3) \\ (8.2-37.5) \\ \hline \end{array}$ | 0.003 | $\begin{aligned} & 10.4 \\ & 11.0 \\ & 19.2 \\ & 17.2 \\ & (8.8) \\ & \hline \end{aligned}$ | $\begin{array}{r} (5.3-19.1) \\ (4.2-25.8) \\ (8.3-38.4) \\ (10.3-27.5) \\ (3.9-18.7) \\ \hline \end{array}$ | 0.328 | $\begin{array}{r} 1.3 \\ 12.2 \\ 21.4 \\ 22.5 \\ (2.2) \\ \hline \end{array}$ | $\begin{array}{r} (1.0-1.6) \\ (4.9-27.3) \\ (14.5-30.4) \\ (10.9-40.6) \\ (0.3-16.1) \\ \hline \end{array}$ | <0.001 | $\begin{array}{r} 3.1 \\ 7.8 \\ 11.4 \\ 11.3 \\ (8.3) \\ \hline \end{array}$ | $\begin{aligned} & (0.7-13.1) \\ & (4.0-14.7) \\ & (4.7-25.0) \\ & (6.4-19.1) \\ & (3.0-21.0) \\ & \hline \end{aligned}$ | 0.417 |
| Ecological Region Mountain Hill Terai | $\begin{array}{r} 71 \\ 104 \\ 153 \end{array}$ | $\begin{aligned} & 38.3 \\ & 43.4 \\ & 42.6 \end{aligned}$ | $\begin{aligned} & (28.1-49.6) \\ & (35.0-52.1) \\ & (35.2-50.3) \end{aligned}$ | 0.882 | $\begin{aligned} & 41.9 \\ & 25.0 \\ & 26.1 \end{aligned}$ | $\begin{gathered} (29.3-55-7) \\ (18-1-33.5) \\ (18.5-35.4) \end{gathered}$ | 0.118 | $\begin{array}{r} 21.7 \\ 7.1 \\ 4.0 \end{array}$ | $\begin{array}{r} (14.8-30.6) \\ (3.8-12.6) \\ (1.9-8.3) \end{array}$ | 0.001 | $\begin{array}{r} 1.9 \\ 9.8 \\ 17.2 \end{array}$ | $\begin{array}{r} (0.7-5.1) \\ (5.4-17.1) \\ (10.4-27.0) \end{array}$ | 0.028 | $\begin{array}{r} 7.1 \\ 10.8 \\ 14.4 \end{array}$ | $\begin{aligned} & (4.1-12.1) \\ & (4.9-22.0) \\ & (8.4-23.8) \end{aligned}$ | 0.503 | $\begin{array}{r} 2.7 \\ 12.9 \\ 6.2 \end{array}$ | $\begin{aligned} & (0.6-11.2) \\ & (8.1-19.9) \\ & (3.3-11.5) \end{aligned}$ | 0.068 |
| $\begin{gathered} \hline \text { Location } \\ \text { Urban } \\ \text { Rural } \\ \hline \end{gathered}$ | $\begin{array}{r}39 \\ 289 \\ \hline\end{array}$ | $\begin{array}{r} (51.7) \\ 41.0 \\ \hline \end{array}$ | $\begin{aligned} & (34.8-68.2) \\ & (35.8-46.4) \end{aligned}$ | 0.212 | $\begin{array}{\|r} \hline(14.7) \\ 29.3 \end{array}$ | $\begin{array}{r} (6.1-31.4) \\ (23.5-35.8) \\ \hline \end{array}$ | 0.034 | $\begin{array}{r} (4.2) \\ 7.3 \\ \hline \end{array}$ | $\begin{aligned} & (1.1-14.6) \\ & (5.0-10.4) \\ & \hline \end{aligned}$ | 0.538 | $\begin{array}{r} (18.3) \\ 12.4 \end{array}$ | $\begin{aligned} & (5.3-47.1) \\ & (8.5-17.6) \\ & \hline \end{aligned}$ | 0.255 | $\begin{array}{r} \text { (8.3) } \\ 13.1 \\ \hline \end{array}$ | $\begin{aligned} & (2.5-23.9) \\ & (8.3-19.9) \\ & \hline \end{aligned}$ | 0.463 | $\begin{array}{r} (11.6) \\ 7.5 \\ \hline \end{array}$ | $\begin{aligned} & (4.0-29.3) \\ & (5.0-11.1) \\ & \hline \end{aligned}$ | 0.357 |
| Age, months <br> $6-8$ <br> $9-11$ <br> $12-17$ <br> $18-23$ <br> $24-35$ <br> $36-47$ <br> $48-59$ <br>  <br> $6-23$ <br> $24-59$ | $\begin{array}{r} 23 \\ 24 \\ 46 \\ 34 \\ 80 \\ 69 \\ 52 \\ \\ 127 \\ 201 \end{array}$ | $*$ $*$ $(29.4)$ $(58.1)$ 37.2 44.4 49.2 41.8 42.7 | $\begin{array}{r} * \\ * \\ (19.0-42.6) \\ (37.4-76.4) \\ (25.8-50.3) \\ (34.0-55.2) \\ (35.4-63.1) \\ (32.9-51.3) \\ (35.5-50.3) \\ \hline \end{array}$ |  | $*$ $*$ $(19.6)$ $(15.7)$ 41.0 24.5 22.6 22.4 30.6 | $*$ $*$ $(11.1-32.2)$ $(6.9-32.0)$ $(28-9-54.2)$ $(15.7-36.3)$ $(14.0-34.3)$ $(15.3-31.5)$ $(23.8-38.3)$ | $\begin{aligned} & 0.014 \\ & 0.106 \end{aligned}$ | $*$ $*$ $(8.3)$ $(5.9)$ 9.6 6.2 6.0 5.8 7.5 | $\begin{array}{r} * \\ * \\ (4.0-16.2) \\ (1.8-17.5) \\ (5.0-17.9) \\ (2.5-14.6) \\ (2.2-15.5) \\ (3.6-9.2) \\ (4.6-12.0) \\ \hline \end{array}$ | $\begin{aligned} & 0.908 \\ & \\ & 0.427 \end{aligned}$ | $*$ $*$ $(21.6)$ $(3.5)$ 13.0 12.9 13.8 13.1 13.2 | $\begin{array}{r} * \\ * \\ (10.9-38.3) \\ (0.8-13.7) \\ (6.8-23.6) \\ (6.5-23.9) \\ (5.0-33.0) \\ \\ (7.4-22.1) \\ (8.4-19.9) \end{array}$ | $\begin{gathered} 0.211 \\ \\ 0.985 \end{gathered}$ | $*$ $*$ $(19.3)$ $(11.1)$ 9.4 13.2 10.8 14.6 11.1 | $*$ $*$ $(8.3-38.8)$ $(3.2-32.1)$ $(4.0-20.6)$ $(5.9-27.0)$ $(4.4-24.2)$ $(8.7-23.4)$ $(6.3-19.0)$ | 0.641 0.338 | $*$ $*$ $(13.8)$ $(7.2)$ 3.0 8.1 9.7 10.5 6.5 | $*$ $*$ $(6.6-26.9)$ $(3.4-14.6)$ $(1.1-7.8)$ $(3.2-19.2)$ $(3.4-24.4)$ $(6.5-16.5)$ $(3.6-11.3)$ | $\begin{aligned} & 0.147 \\ & \\ & 0.202 \end{aligned}$ |
| Sex <br> Male <br> Female | $\begin{aligned} & 158 \\ & 170 \end{aligned}$ | $\begin{aligned} & 41.6 \\ & 43.2 \end{aligned}$ | $\begin{aligned} & (34.1-49.6) \\ & (34.6-52.1) \\ & \hline \end{aligned}$ | 0.789 | $\begin{aligned} & 25.9 \\ & 28.9 \end{aligned}$ | $\begin{aligned} & (20.1-32.7) \\ & (21.0-38.4) \\ & \hline \end{aligned}$ | 0.555 | $\begin{array}{r} 4.8 \\ 9.0 \\ \hline \end{array}$ | $\begin{array}{r} (2.5-9.0) \\ (5.8-13.7) \end{array}$ | 0.127 | $\begin{aligned} & 14.8 \\ & 11.4 \end{aligned}$ | $\begin{aligned} & (9.5-22.4) \\ & (6.4-19.4) \end{aligned}$ | 0.353 | $\begin{aligned} & 13.6 \\ & 11.3 \end{aligned}$ | $\begin{aligned} & (8.3-21.4) \\ & (6.4-19.3) \\ & \hline \end{aligned}$ | 0.536 |  | $\begin{aligned} & (5.4-14.3) \\ & (3.8-13.0) \\ & \hline \end{aligned}$ | 0.569 |
| Maternal Education <br> No education ${ }^{\text {a }}$ <br> Primary ${ }^{\text {b }}$ <br> Some secondary ${ }^{\text {c }}$ <br> SLC and above ${ }^{\text {d }}$ | $\begin{aligned} & 34 \\ & 37 \\ & 39 \\ & 41 \end{aligned}$ | $\begin{aligned} & (62.5) \\ & (24.2) \\ & (40.0) \\ & (30.0) \end{aligned}$ | $\begin{aligned} & (37.8-82.0) \\ & (13.1-40.2) \\ & (26.9-54.8) \\ & (19.6-42.9) \\ & \hline \end{aligned}$ | 0.007 | $\begin{aligned} & (25.9) \\ & (34.6) \\ & (31.6) \\ & (26.8) \end{aligned}$ | $\begin{aligned} & (10.3-51.4) \\ & (18.4-55.4) \\ & (18.1-49.2) \\ & (15.5-42.2) \\ & \hline \end{aligned}$ | 0.861 | $\begin{array}{r} (3.8) \\ (10.0) \\ (5.0) \\ (12.1) \end{array}$ | $\begin{aligned} & (1.1-12.3) \\ & (3.6-24.7) \\ & (1.2-18.3) \\ & (5.0-26.8) \\ & \hline \end{aligned}$ | 0.347 | $\begin{array}{r} (8.5) \\ (12.0) \\ (10.3) \\ 17.6 \end{array}$ | $\begin{aligned} & (2.5-24.7) \\ & (3.9-31.1) \\ & (3.1-29.0) \\ & (9.1-31.2) \\ & \hline \end{aligned}$ | 0.675 | $\begin{array}{r} (3.8) \\ (11.8) \\ (20.2) \\ 9.0 \end{array}$ | $\begin{aligned} & (0.5-22.4) \\ & (4.3-28.7) \\ & (7.5-44.2) \\ & (4.0-19.1) \end{aligned}$ | 0.103 | $\begin{array}{r} (10.7) \\ (15.4) \\ (8.0) \\ 6.6 \end{array}$ | $\begin{array}{r} (2.3-38.3) \\ (10.4-22.2) \\ (2.9-20.5) \\ (1.3-27.0) \\ \hline \end{array}$ | 0.671 |

Table 8.2: Cont'd...

| Characteristics | N | Did not give treatment |  |  | Treatment given to child for diarrhea |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | ORS |  |  | Zinc Supplements |  |  | Antibiotics |  |  | Anti-diarrheals |  |  | Home Remedies |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | 95\% CI | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 92 | 49.3 | (36.9-61.8) |  | 27.9 | (18.3-40.2) |  | 6.5 | (3.1-13.1) |  | 3.7 | (1.2-10.7) |  | 10.5 | (3.6-27.1) |  | 15.7 | (9.1-25.7) |  |
| Second | 69 | 50.7 | (37.9-63.4) |  | 29.6 | (21.8-38.8) |  | 11.2 | (6.1-19.8) |  | 7.0 | (3.1-15.2) |  | 9.1 | (4.0-19.4) |  | 2.2 | (0.7-7.0) |  |
| Middle | 65 | 32.8 | (21.6-46.4) | 0.145 | 29.2 | (13.9-51.5) | 0.166 | 4.4 | (1.8-10.0) | 0.101 | 14.6 | (7.9-25.4) | 0.001 | 18.0 | (7.2-38.6) | 0.485 | 6.6 | (2.5-16.1) | 0.009 |
| Fourth | 60 | 41.0 | (28.3-55.0) |  | 34.0 | (21.5-49.2) |  | 2.1 | (0.3-13.9) |  | 20.3 | (9.9-37.3) |  | 13.3 | (6.7-24.6) |  | 2.7 | (0.5-12.5) |  |
| Highest | 42 | (37.1) | (22.7-54.3) |  | (13.1) | (5.8-27.0) |  | (11.7) | (4.6-26.6) |  | (24.5) | (9.9-49.0) |  | (10.5) | (4.5-22.7) |  | (11.6) | (4.7-26.0) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 23 | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  |
| Hill Chhetri | 74 | 38.8 | (27.4-51.6) |  | 25.5 | (17.9-35.0) |  | 11.4 | (5.6-22.0) |  | 11.5 | (5.6-22.1) |  | 21.6 | (10.4-39.5) |  | 7.4 | (4.0-13.5) |  |
| Terai Brahmin/Chhetri | 6 | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  |
| Other Terai Caste | 32 | (59.9) | (42.4-75.2) |  | (18.3) | (7.3-38.8) |  | (2.7) | (0.6-10.9) |  | (0.8) | (0.1-5.7) |  | (19.9) | (6.6-46.8) |  | (4.7) | (0.6-29.6) |  |
| Hill Dalit | 56 | 25.4 | (15.3-39.0) |  | 40.8 | (28.4-54.5) |  | 13.3 | (7.1-23.5) |  | 19.9 | (12.1-30.9) | <0.001 | 12.7 | (4.9-29.1) | 0.030 | 10.5 | (4.2-23.9) |  |
| Terai Dalit | 24 | * | * |  | * | * | 0.072 | * | * | 0.179 | * | * | <0.001 | * | * | 0.030 | * | * | 0.60 |
| Newar | 10 | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  | * | * |  |
| Hill Janajati | 64 | 47.9 | (39.2-56.7) |  | 27.5 | (19.4-37.4 |  | 4.5 | (1.8-10.9) |  | 5.0 | (1.8-13.2) |  | 3.9 | (1.5-10.0) |  | 12.7 | (7.7-20.3) |  |
| Terai Janajati | 25 | (24.6) | (10.2-48.4) |  | (44.0) | (24.3-65.8) |  | (2.6) | (0.3-17.3) |  | (29.9) | (14.4-51.9) |  | (2.6) | (0.4-15.6) |  | (10.0) | (2.8-29.5) |  |
| Muslim | 14 | * | * |  | * | * |  | * | * |  | * | * |  | 0.0 | - |  | * | * |  |
| Total | 328 | 42.4 | (372-47.7) |  | 27.4 | (22.1-33.5) |  | 6.9 | (4.8-9.7) |  | 13.1 | (8.8-19.1) |  | 12.5 | (8.2-18.5) |  | 8.0 | (5.5-11.6) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with cauten
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
An asterisk indicates that a figure is based on to misht vary slightly due to mita.
P-value obtained from Pearson's chi-square test.
a Includes those who have never attended school.
${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {'Inclu}}$ Includes those who have completed 6-9 years of school.
'Includes those who have completed 6-9 years of school.
dincludes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.3: Recent Morbidity During the Last Two Weeks among Children 6-9 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 218 |  | (10.3-19.2) |  | 14.3 | (10.0-20.2) |  | 4.9 | (2.5-9.3) |  |
| Central | 227 |  | (11.1-22.4) |  | 15.4 | (10.5-21.9) |  | 6.2 | (3.3-11.4) |  |
| Western | 205 | 15.8 | (13.0-19.0) | 0.603 | 17.9 | (13.6-23.1) | 0.193 | 6.7 | (3.7-11.9) | 0.386 |
| Mid-western | 244 | 19.3 | (16.2-22.9) |  | 14.8 | (10.5-20.5) |  | 9.3 | (6.3-13.4) |  |
| Far-western | 244 | 19.5 | (15.0-24.9) |  | 23.6 | (17.7-30.7) |  | 4.6 | (2.6-8.1) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 177 | 25.1 | (20.0-31.0) |  | 24.6 | (18.9-31.5) |  | 9.0 | (5.4-14.5) |  |
| Hill | 476 | 19.7 | (17.5-22.1) | 0.001 | 14.5 | (11.9-17.6) | 0.058 | 4.5 | (2.9-6.8) | 0.124 |
| Terai | 485 | 12.8 | (9.1-17.5) |  | 16.6 | (12.5-21.8) |  | 7.4 | (4.8-11.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 12.3 | (7.5-19.5) | 0176 | 15.1 | (9.6-23.1) | 0.705 | 2.0 | (0.6-6.7) | 0.04 |
| Rural | 995 | 17.0 | (14.5-19.9) | 0.176 | 16.5 | (13.7-19.8) | , | 6.9 | (5.1-9.2) | . 044 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 6 | 260 |  | (16.5-27.5) |  | 18.5 | (13.6-24.5) |  | 7.6 | (4.4-12.7) |  |
| 7 | 268 | 13.7 | (9.8-18.7) | 0.053 | 9.7 | (7.1-13.2) | 0.002 | 5.4 | (2.7-10.2) | 0.727 |
| 8 | 335 | 16.5 | (11.9-22.4) |  | 20.6 | (15.0-27.6) |  | 6.6 | (4.1-10.4) |  |
| 9 | 275 | 14.3 | (11.1-18.3) |  | 16.3 | (12.1-21.7) |  | 5.8 | (3.4-9.7) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 559 | 19.7 | (16.7-23.1) | 0.003 | 18.0 | (14.2-22.4) | 0150 | 6.8 | (4.8-9.5) |  |
| Female | 579 | 13.3 | (10.1-17.3) | 0.003 | 14.8 | (11.9-18.2) | 0.150 | 5.9 | (3.5-9.7) | 0.562 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 29 | (6.5) | (1.9-19.9) | 0.157 | (6.9) | (1.7-24.0) | 0160 | (24.4) | (12.3-42.6) |  |
| Primary ${ }^{\text {b }}$ | 1104 | 17.0 | (14.8-19.4) | 157 | 16.9 | (14.4-19.6) | 0.160 | 5.6 | (4.1-7.7) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 328 | 18.0 | (14.4-22.3) |  | 13.4 | (10.0-17.9) |  | 7.2 | (5.2-9.8) |  |
| Second | 244 | 24.6 | (18.4-32.0) |  | 23.9 | (18.7-29.9) |  | 6.1 | (3.1-11.6) |  |
| Middle | 200 | 15.1 | (11.2-20.0) | 0.001 | 15.9 | (11.0-22.4) | 0.003 | 8.2 | (4.8-13.4) | 0.203 |
| Fourth | 203 | 11.2 | (6.7-18.4) |  | 17.7 | (12.0-25.5) |  | 6.9 | (3.4-13.4) |  |
| Highest | 163 | 12.7 | (8.2-19.1) |  | 10.7 | ( (6.7-16.7) |  | 2.8 | (1.1-6.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 110 | 18.1 | (12.2-26.0) |  | 13.6 | (8.2-21.9) |  | 4.0 | (1.8-8.7) |  |
| Hill Chhetri | 267 | 20.4 | (15.0-27.2) |  | 20.4 | (14.6-27.8) |  | 4.0 | (2.1-7.4) |  |
| Terai Brahmin/Chhetri | 30 | (22.1) | (12.8-35.5) |  | (24.1) | (11.3-44.3) |  | (3.6) | (0.5-22.6) |  |
| Other Terai caste | 81 | 11.9 | (4.6-27.3) |  | 20.7 | (11.5-34.5) |  | 6.7 | (2.9-14.6) |  |
| Hill Dalit | 165 | 19.2 | (14.4-25.1) |  | 19.9 | (14.8-26.2) | . 025 | 8.1 | (5.1-12.5) | 0.068 |
| Terai Dalit | 56 |  | (3.2-26.6) |  | 11.1 | (5.3-21.9) | . 025 | 12.6 | (6.5-23.0) | 0.068 |
| Newar | 30 | (14.3) | (7.3-26.1) |  | (10.6) | (4.7-22.5) |  | (0.0) | - |  |
| Hill Janajati | 273 |  | (16.4-22.5) |  | 14.4 | (11.4-17.9) |  | 7.0 | (4.3-11.2) |  |
| Terai Janajati | 97 | 12.4 | (6.5-22.4) |  | 10.5 | (4.7-21.8) |  | 8.4 | (3.8-17.4) |  |
| Muslim | 28 | (10.3) | (2.9-30.4) |  | (9.9) | (2.2-35.3) |  | (0.0) | - |  |
| Total | 1,138 | 16.5 | (14.1-19.1) |  | 16.4 | (13.8-19.3) |  | 6.3 | (4.7-8.4) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Includes those who have never attended school. <br> ${ }^{\mathrm{b}}$ Includes those who have completed $0-5$ years of school. |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

Table 8.4: Recent Morbidity During the Last Two Weeks among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 208 | 17.1 | 10.1-27.7) |  | 12.6 | (7.7-19.8) |  | 11.4 | (7.1-17.8) |  |
| Central | 209 | 7.2 | (4.3-11.9) |  | 11.7 | (8.2-16.5) |  | 4.6 | (2.5-8.3) |  |
| Western | 195 | 5.4 | (2.9-9.7) | <0.001 | 8.1 | (4.4-14.3) | 0.213 | 5.5 | (3.2-9.1) | 0.027 |
| Mid-western | 199 | 14.0 | (10.0-19.3) |  | 12.4 | (8.2-18.3) |  | 7.4 | (4.4-12.2) |  |
| Far-western | 214 | 14.9 | (10.4-20.7) |  | 16.4 | (10.8-24.3) |  | 7.2 | (4.3-12.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 157 | 18.0 | (12.7-24.8) |  | 26.9 | (18.0-38.1) |  | 9.5 | (6.1-14.6) |  |
| Hill | 435 | 9.5 | (7.6-11.8) | 0.090 | 10.7 | (7.9-14.3) | <0.001 | 4.3 | (2.9-6.2) | 0.013 |
| Terai | 433 | 11.0 | (7.2-16.4) |  | 10.7 | (7.7-14.8) |  | 8.9 | (6.2-12.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 143 | 12.1 | (6.6-20.9) | 0.637 | 12.9 | (7.1-22.1) | 0.703 | 5.4 | (2.5-11.3) |  |
| Rural | 882 | 10.6 | (8.3-13.6) | , 637 | 11.6 | (9.4-14.2) | 0.703 | 7.2 | (5.4-9.6) | . 477 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 207 | 15.5 | (10.5-22.2) |  | 10.0 | (6.0-16.2) |  | 4.2 | (2.1-8.2) |  |
| 12-13 | 265 | 8.1 | (5.8-11.2) |  | 15.9 | (11.2-22.1) |  | 10.9 | (6.9-16.7) |  |
| 14-15 | 238 | 10.8 | (6.9-16.5) | 0.035 | 10.2 | (6.6-15.4) | 0.225 | 8.9 | (5.8-13.4) | 0.017 |
| 16-17 | 165 | 6.9 | (3.9-11.9) |  | 10.4 | (6.2-16.9) |  | 4.1 | (1.8-9.0) |  |
| 18-19 | 150 | 12.9 | (7.4-21.4) |  | 11.4 | (7.0-18.2) |  | 4.9 | (2.1-10.9) |  |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 7 | * | * |  | * | * |  | * | * |  |
| Primary ${ }^{\text {b }}$ | 321 | 13.2 | (9.1-18.8) | 0.121 | 11 | (7.5-16.5) | 0.558 | 8.0 | (5.0-12.6) | 0.335 |
| Some secondary ${ }^{\text {c }}$ | 553 | 10.3 | (7.6-13.8) | 0.121 | 12.9 | (10.3-16.0) | 0.558 | 7.2 | (4.9-10.5) | 0.335 |
| SLC and above ${ }^{\text {d }}$ | 144 | 7.6 | (3.6-15.2) |  | 10.1 | (5.8-16.9) |  | 4.6 | (2.2-9.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 252 | 13.0 | (9.9-17.0) |  | 13.6 | (10.1-18.2) |  | 6.7 | (4.2-10.7) |  |
| Second | 211 | 10.0 | (7.0-14.0) |  | 11.7 | (8.2-16.3) |  | 9.1 | (5.3-15.2) |  |
| Middle | 209 | 10.2 | (6.3-16.1) | 0.873 | 10.7 | (6.5-17.3) | 0.901 | 6.8 | (4.1-11.2) | 0.589 |
| Fourth | 165 | 10.6 | (5.4-19.6) |  | 10.9 | (6.3-18.2) |  | 7.2 | (3.8-13.3) |  |
| Highest | 188 | 10.7 | (5.5-19.8) |  | 12.1 | (7.7-18.5) |  | 5.3 | (2.5-10.6) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 13.2 | (7.9-21.4) |  | 17.3 | (11.3-25.5) |  | 4.4 | (2.0-9.3) |  |
| Hill Chhetri | 267 | 10.6 | (7.3-15.2) |  | 10.2 | (6.9-14.9) |  | 6.0 | (3.6-9.8) |  |
| Terai Brahmin/Chhetri | 32 | (18.9) | (4.5-53.9) |  | (13.1) | (6.6-24.5) |  | (12.4) | (4.5-30.0) |  |
| Other Terai caste | 70 | 6.9 | (2.8-16.1) |  | 9.0 | (3.7-20.4) |  | 5.9 | (2.4-13.7) |  |
| Hill Dalit | 121 | 13.7 | (9.1-20.1) | 0.244 | 17.5 | (11.6-25.5) | 0.080 | 5.2 | (2.9-9.4) | 0.019 |
| Terai Dalit | 38 | (12.4) | (4.1-32.0) | 0.244 | (5.4) | (1.0-25.1) | 0.080 | (9.8) | (2.7-30.2) | 0.019 |
| Newar | 37 | (2.6) | (0.6-9.9) |  | (3.5) | (0.8-14.0) |  | (4.7) | (1.2-16.1) |  |
| Hill Janajati | 211 | 9.4 | (7.3-12.1) |  | 15.0 | (11.4-19.4) |  | 4.5 | (2.7-7.3) |  |
| Terai Janajati | 90 | 10.3 | (4.7-20.9) |  | 11.6 | (5.5-22.9) |  | 14.7 | (8.5-24.1) |  |
| Muslim | 22 | * | * |  | * | * |  | * | * |  |
| Total | 1,025 | 10.8 | (8.6-13.6) |  | 11.8 | (9.6-14.4) |  | 7.0 | (5.4-9.0) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c Includes the }}$ those who have completed 6-9 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.5: Recent Morbidity During the Last Two Weeks among Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 356 \\ & 357 \\ & 352 \\ & 383 \\ & 415 \end{aligned}$ | $\begin{array}{r} 16.5 \\ 15.6 \\ 9.8 \\ 18.9 \\ 15.7 \end{array}$ | $\begin{array}{r} (12.4-21.5) \\ (12.5-19.3) \\ (6.8-14.0) \\ (15.4-23.0) \\ (12.1-20.2) \end{array}$ | 0.017 | $\begin{aligned} & 16.0 \\ & 18.3 \\ & 17.5 \\ & 21.4 \\ & 21.4 \end{aligned}$ | $\begin{aligned} & (11.8-21.4) \\ & (15.7-21.2) \\ & (14.2-21.3) \\ & (17.1-26.3) \\ & (17.6-25.7) \end{aligned}$ | 0.344 | 9.3 7.6 7.7 8.5 11.0 | $\begin{aligned} & (6.4-13.3) \\ & (4.1-13.9) \\ & (5.7-10.5) \\ & (5.1-13.9) \\ & (8.2-14.7) \end{aligned}$ | 0.596 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 290 \\ & 782 \\ & 791 \\ & \hline \end{aligned}$ | $\begin{aligned} & 23.9 \\ & 15.3 \\ & 13.6 \\ & \hline \end{aligned}$ | $\begin{aligned} & (17.5-31.8) \\ & (12.9-18.0) \\ & (11.0-16.7) \\ & \hline \end{aligned}$ | 0.007 | $\begin{aligned} & 30.4 \\ & 19.2 \\ & 15.8 \\ & \hline \end{aligned}$ | $(23.6-38.1)$ $(17.0-21.6)$ $(13.3-18.8)$ | <0.001 | $\begin{array}{r} 11.5 \\ 7.3 \\ 9.1 \\ \hline \end{array}$ | $\begin{array}{r} (6.9-18.6) \\ (5.8-9.3) \\ (6.3-13.2) \\ \hline \end{array}$ | 0.175 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 216 \\ 1,647 \end{array}$ | $\begin{array}{r} 9.7 \\ 15.7 \end{array}$ | $\begin{array}{r} (3.9-22.4) \\ (13.8-17.8) \end{array}$ | 0.026 | $\begin{aligned} & 14.0 \\ & 18.9 \end{aligned}$ | $\begin{array}{r} (8.8-21.6) \\ (17.0-20.9) \\ \hline \end{array}$ | 0.090 | 3.3 9.1 | $\begin{array}{r} (1.4-7.5) \\ (7.2-11.4) \end{array}$ | 0.006 |
| Age, years $10-11$ $12-13$ $14-15$ $16-17$ $18-19$ | $\begin{aligned} & 343 \\ & 444 \\ & 404 \\ & 329 \\ & 343 \end{aligned}$ | $\begin{aligned} & 18.3 \\ & 15.5 \\ & 14.2 \\ & 12.8 \\ & 14.7 \\ & \hline \end{aligned}$ | $\begin{aligned} & (14.7-22.5) \\ & (12.2-19.4) \\ & (10.9-18.1) \\ & (10.0-16.3) \\ & (11.0-19.3) \end{aligned}$ | 0.355 | $\begin{aligned} & 15.9 \\ & 20.2 \\ & 18.8 \\ & 19.8 \\ & 16.5 \end{aligned}$ | $\begin{aligned} & (12.0-20.9) \\ & (16.1-25.1) \\ & (14.5-24.1) \\ & (16.3-23.9) \\ & (12.0-22.3) \end{aligned}$ | 0.436 | 11.0 8.3 7.5 8.0 8.2 | $\begin{aligned} & (7.1-16.6) \\ & (6.2-11.1) \\ & (4.8-11.6) \\ & (5.1-12.2) \\ & (5.7-11.6) \\ & \hline \end{aligned}$ | 0.528 |
| Lactating Status(among those who had given birth in the last 5 years) <br> Yes <br> No | 82 |  | (7.7-32.8) |  |  | (17.8-43.5) |  |  | (6.9-25.9) |  |
| Education <br> No education ${ }^{\text {a }}$ <br> Primary ${ }^{\text {b }}$ <br> Some secondary ${ }^{\text {c }}$ SLC and above ${ }^{\text {d }}$ | $\begin{array}{r} 54 \\ 541 \\ 1,003 \\ 264 \\ \hline \end{array}$ | $\begin{array}{r} 15.3 \\ 21.0 \\ 13.3 \\ 9.7 \\ \hline \end{array}$ | $\begin{array}{r} (4.9-38.7) \\ (17.7-24.8) \\ (11.6-15.2) \\ (6.4-14.5) \\ \hline \end{array}$ | <0.001 | $\begin{aligned} & 21.5 \\ & 19.7 \\ & 18.5 \\ & 14.7 \\ & \hline \end{aligned}$ | $\begin{aligned} & (14.1-31.4) \\ & (16.7-22.9) \\ & (16.1-21.1) \\ & (10.6-20.0) \\ & \hline \end{aligned}$ | 0.278 | $\begin{array}{r} 12.4 \\ 10.7 \\ 7.2 \\ 7.8 \\ \hline \end{array}$ | $\begin{array}{r} (4.7-28.6) \\ (6.7-16.5) \\ (5.6-9.2) \\ (4.8-12.3) \\ \hline \end{array}$ | 0.064 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 494 \\ & 429 \\ & 338 \\ & 330 \\ & 272 \end{aligned}$ | $\begin{array}{r} 18.6 \\ 21.5 \\ 10.9 \\ 12.6 \\ 9.5 \end{array}$ | $\begin{array}{r} (15.1-22.8) \\ (16.7-27.3) \\ (7.3-16.0) \\ (8.7-17.9) \\ (6.1-14.4) \end{array}$ | <0.001 | $\begin{aligned} & 23.4 \\ & 21.4 \\ & 15.5 \\ & 16.9 \\ & 12.5 \end{aligned}$ | $\begin{array}{r} (19.3-28.0) \\ (17.7-25.7) \\ (11.2-21.2) \\ (11.7-23.8) \\ (8.4-18.0) \\ \hline \end{array}$ | 0.001 | $\begin{array}{r} 7.7 \\ 10.8 \\ 10.0 \\ 7.3 \\ 6.1 \end{array}$ | $\begin{aligned} & (5.3-11.1) \\ & (7.7-15.0) \\ & (5.9-16.3) \\ & (4.9-10.7) \\ & (3.6-10.4) \\ & \hline \end{aligned}$ | 0.117 |
| Ethnicity Hill Brahmin Hill Chhetri Terai Brahmin/Chhetri Other Terai caste Hill Dalit Terai Dalit Newar Hill Janajati Terai Janajati Muslim | $\begin{array}{r} 220 \\ 445 \\ 43 \\ 128 \\ 234 \\ 92 \\ 58 \\ 418 \\ 188 \\ 37 \\ \hline \end{array}$ | 11.9 12.3 $(20.7)$ 19.3 17.2 22.8 11.6 16.4 7.8 $(13.8)$ | $\begin{array}{r} (7.7-18.0) \\ (9.5-15.8) \\ (9.7-38.8) \\ (13.6-26.7) \\ (11.4-25.1) \\ (16.7-30.2) \\ (4.8-25.5) \\ (13.4-19.8) \\ (3.9-14.8) \\ (5.7-29.9) \\ \hline \end{array}$ | $0.007$ | 15.2 19.2 $(16.1)$ 20.9 17.4 15.8 20.5 20.3 14.3 $(23.7)$ | $\begin{array}{r} (9.9-22.7) \\ (16.1-22.7) \\ (6.1-36.2) \\ (15.2-28.1 \\ (10.7-27.2) \\ (7.9-29.2) \\ (10.9-35.3) \\ (17.0-24.1) \\ (8.3-23.5) \\ (12.5-40.3) \\ \hline \end{array}$ | $0.624$ | 9.6 6.0 $(12.3)$ 7.7 9.6 15.8 7.1 6.5 9.7 $(13.3)$ | $\begin{array}{r} (6.1-14.9) \\ (4.4-8.2) \\ (5.1-26.8) \\ (4.3-13.4) \\ (6.2-14.6) \\ (5.7-36.8) \\ (3.0-16.2) \\ (4.4-9.4) \\ (5.5-16.7) \\ (3.4-40.0) \\ \hline \end{array}$ | $0.021$ |
| Total | 1,863 |  | (13.4-17.0) |  |  | (16.7-20.2) |  |  | (6.8-10.6) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\mathrm{a}}$ Includes those who have never attended school. <br> ${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school. <br> ${ }^{\text {CIIncludes those who have completed 6-9 years of school. }}$ <br> ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |

Table 8.6: Recent Morbidity During the Last Two Weeks among Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 427 | 12.8 | (9.9-16.3) |  | 14.9 | (12.1-18.3) |  | 7.8 | (5.7-10.7) |  |
| Central | 428 | 12.5 | (9.2-16.8) |  | 11.5 | (8.2-16.1) |  | 11.3 | (8.7-14.6) |  |
| Western | 429 | 10.9 | (8.5-13.9) | 0.002 | 14.7 | (12.3-17.6) | 0.008 | 6.8 | (5.3-8.7) | 0.092 |
| Mid-western | 430 | 18.8 | (14.5-24.1) |  | 20.2 | (15.5-25.8) |  | 9.5 | (6.9-12.9) |  |
| Far-western | 430 | 19.9 | (16.4-23.9) |  | 17.6 | (14.2-21.5) |  | 8.8 | (6.4-12.1) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 359 | 24.8 | (19.5-30.9) |  | 21.1 | (16.9-26.0) |  | 9.9 | (7.3-13.4) |  |
| Hill | 895 | 15.5 | (12.8-18.6) | $<0.001$ | 15.6 | (13.3-18.3) | 0.026 | 8.2 | (6.3-10.5) | 0.354 |
| Terai | 890 | 11.0 | (9.0-13.3) |  | 13.0 | (10.5-16.0) |  | 9.9 | (8.2-12.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 296 | 9.9 | (7.5-13.0) |  | 11.4 | (7.0-17.9) |  | 6.6 | (3.2-13.0) |  |
| Rural | 1,848 | 14.4 | (12.5-16.5) | 0.037 | 15.2 | (13.4-17.2) | 0.077 | 9.6 | (8.4-10.9) | 0.085 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 235 | 18.9 | (13.3-26.2) |  | 19.4 | (13.5-27.0) |  | 9.5 | (5.8-15.2) |  |
| 20-29 | 861 | 12.8 | (10.8-15.1) | 0.006 | 14.1 | (12.1-16.4) | 0.170 | 9.1 | (7.1-11.7) | 0.317 |
| 30-39 | 672 | 15.7 | (12.4-19.6) |  | 15.0 | (12.4-18.0) |  | 10.3 | (7.8-13.4) |  |
| 40-49 | 376 | 9.7 | (7.2-12.9) |  | 12.6 | (9.3-16.9) |  | 6.9 | (4.5-10.6) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |
| Yes | 595 | 13.1 | (10.8-15.8) | 0.484 | 15.0 | (11.8-19.0) | 0.216 | 9.3 | (7.3-11.8) | 0.523 |
| No | 235 | 14.8 | (10.2-21.0) | 0.484 | 11.7 | (8.0-16.8) | 0.216 | 7.9 | (4.9-12.4) | 0.523 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 712 | 15.7 | (13.4-18.3) |  | 13.8 | (11.4-16.7) |  | 10.0 | (7.6-13.0) |  |
| Primary ${ }^{\text {b }}$ | 363 | 17.4 | (13.7-21.8) | 0.001 | 19.8 | (15.1-25.6) | <0.001 | 10.6 | (7.7-14.5) | 0.495 |
| Some secondary ${ }^{\text {c }}$ | 553 | 14.2 | (10.9-18.3) | 0.001 | 16.8 | (13.7-20.5) | <0.001 | 8.4 | (5.5-12.6) | 0.495 |
| SLC and above ${ }^{\text {d }}$ | 516 | 8.9 | (6.5-12.0) |  | 10.2 | (7.9-13.2) |  | 8.1 | (5.5-11.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 483 | 18.8 | (16.0-22.1) |  | 18.1 | (14.5-22.4) |  | 8.1 | (6.1-10.8) |  |
| Second | 448 | 18.6 | (15.7-22.0) |  | 18.6 | (15.6-22.1) |  | 12.2 | (9.6-15.3) |  |
| Middle | 418 | 11.4 | (8.9-14.4) | $<0.001$ | 16.2 | (12.3-21.1) | <0.001 | 10.4 | (7.7-13.8) | 0.014 |
| Fourth | 400 | 14.5 | (10.2-20.2) |  | 12.8 | (9.0-17.9) |  | 10.0 | (7.3-13.6) |  |
| Highest | 395 | 8.5 | (5.1-14.0) |  | 9.8 | (7.0-13.6) |  | 6.0 | (3.5-10.0) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 282 | 9.6 | (6.4-14.1) |  | 12.4 | (9.5-16.2) |  | 7.2 | (4.2-12.0) |  |
| Hill Chhetri | 509 | 15.9 | (12.6-19.8) |  | 15.1 | (11.1-20.2) |  | 8.2 | (5.7-11.6) |  |
| Terai Brahmin/Chhetri | 61 | 8.6 | (4.6-15.5) |  | 11.3 | (5.0-23.4) |  | 5.4 | (1.8-14.8) |  |
| Other Terai caste | 129 | 13.0 | (9.6-17.4) |  | 12.9 | (7.2-22.1) |  | 11.8 | (6.4-20.7) |  |
| Hill Dalit | 266 | 20.9 | (15.9-27.0) | 0.015 | 20.8 | (16.2-26.4) | 0.042 | 10.6 | (7.4-14.8) | 0.783 |
| Terai Dalit | 91 | 15.7 | (9.6-24.7) | 0.015 | 20.2 | (15.2-26.5) | 0.042 | 11.7 | (4.6-26.5) | 0.783 |
| Newar | 73 | 19.9 | (10.2-35.1) |  | 12.3 | (6.6-21.8) |  | 9.9 | (4.9-19.1) |  |
| Hill Janajati | 495 | 12.4 | (9.8-15.6) |  | 14.7 | (11.2-19.1) |  | 9.4 | (7.1-12.5) |  |
| Terai Janajati | 199 | 11.6 | (6.7-19.3) |  | 13.7 | (8.9-20.6) |  | 9.4 | (5.2-16.5) |  |
| Muslim | 37 | (12.0) | (6.1-22.3) |  | (2.5) | (0.5-11.0) |  | (6.9) | (2.6-17.3) |  |
| Total | 2,144 | 13.8 | (12.1-15.6) |  | 14.6 | (13.0-16.5) |  | 9.2 | (7.9-10.6) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c I Includes those }}$ who have completed years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.7: Recent Morbidity During the Last Two Weeks among Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Fever |  |  | Cough |  |  | Diarrhea |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  | 0.174 |  |  | 0.207 |  |  | 0.535 |
| Eastern | 45 | (10.4) | (6.0-17.4) |  | (21.6) | (10.6-39.1) |  | (9.9) | (3.3-26.0) |  |
| Central | 45 | (16.6) | (8.6-29.5) |  | (24.2) | (15.8-35.2) |  | (3.6) | (2.7-4.8) |  |
| Western | 36 | (7.9) | (3.1-18.6) |  | (7.0) | (3.2-14.4) |  | (7.3) | (2.5-19.6) |  |
| Mid-western | 45 | (29.6) | (17.9-44.8) |  | (29.3) | (17.1-45.4) |  | (3.9) | (0.9-15.2) |  |
| Far-western | 36 | (21.3) | (13.6-31.9) |  | (18.8) | (10.9-30.6) |  | (2.5) | (0.3-17.4) |  |
| Ecological Region |  |  |  | 0.645 |  |  | 0.177 |  |  | 0.073 |
| Mountain | 22 | * | * |  |  | * |  | * | * |  |
| Hill | 89 | 16.9 | (11.9-23.4) |  | 15.3 | (10.0-22.7) |  | 2.3 | (1.0-5.0) |  |
| Terai | 96 | 14.7 | (8.4-24.6) |  | 23.7 | (15.6-34.3) |  | 8.4 | (4.3-15.9) |  |
| Location |  |  |  |  |  |  | 0.439 |  |  | 0.006 |
| Urban | 26 | (9.0) | (4.4-17.6) | 0.402 | (14.9) | (4.1-41.6) |  | (17.3) | (6.1-40.6) |  |
| Rural | 181 | 16.4 | (11.7-22.5) |  |  | (16.3-28.4) |  | 4.5 | (2.5-8.0) |  |
| Age, years |  |  |  | 1.088 |  |  | 2.785 |  |  | 0.151 |
| 15-19 | 38 | (21.3) | (12.2-34.5) |  | (23.3) | (11.4-41.6) |  | (4.0) | (1.6-9.9) |  |
| 20-29 | 142 | 14.2 | (8.6-22.6) |  |  | (11.7-28.1) |  | 5.9 | (3.2-10.5) |  |
| 30-49 | 27 | (15.1) | (7.8-27.4) |  | (30.8) | (12.7-57.7) |  | (7.9) | (1.3-35.4) |  |
| Trimester of Pregnancy (among pregnant women) |  |  |  | 0.094 |  |  | 0.004 |  |  | 0.201 |
| First trimester | 57 | 9.5 | 5.1-17.0 |  |  | ((4.9-14.4) |  | 1.6 | (0.2-10.9) |  |
| Second trimester | 75 | 22.8 | 15.5-32.4 |  |  | (23.1-44.2) |  | 9.1 | (4.0-19.4) |  |
| Third trimester | 75 | 12.8 | 6.7-23.2 |  | 18.1 | (12.0-26.4) |  | 5.4 | (3.1-9.1) |  |
| Education |  |  |  | 0.323 |  |  | 0.818 |  |  | 0.777 |
| No education ${ }^{\text {a }}$ | 44 | (19.9) | (10.1-35.4) |  | (24.3) | (14.3-38.1) |  | (6.3) | (3.9-10.0) |  |
| Primary ${ }^{\text {b }}$ | 43 | (14.2) | (7.0-26.6) |  | (16.9) | (9.7-27.9) |  | (6.9) | (3.0-15.3) |  |
| Some secondary ${ }^{\text {c }}$ | 61 |  | (14.5-28.2) |  |  | (14.0-34.7) |  | 7.4 | (2.7-18.5) |  |
| SLC and above ${ }^{\text {d }}$ | 59 | 9.5 | (3.5-23.1) |  | 20.7 | (13.5-30.2) |  | 3.1 | (0.4-20.1) |  |
| Wealth Quintile |  |  |  | 0.038 |  |  | 0.119 |  |  | 0.338 |
| Lowest | 48 | (30.8) | (19.1-45.5) |  | (24.7) | (13.5-40.8) |  | (4.4) | (2.0-9.0) |  |
| Second | 43 | (16.5) | (8.9-28.7) |  | (20.0) | (13.0-29.5) |  | (0.0) | - |  |
| Middle | 38 | (18.9) | (8.8-36.0) |  | (31.4) | (19.1-47.1) |  | (6.2) | (3.1-11.8) |  |
| Fourth | 54 | 8.4 | (3.6-18.6) |  | 12.5 | (4.2-31.6) |  | 4.0 | (1.3-11.7) |  |
| Highest | 24 | * | * |  | * | * |  | * | * |  |
| Dewormed in last 6 months |  |  |  | 0.461 |  |  | 0.460 |  |  | 0.333 |
| Yes | 108 | 13.9 | (8.6-21.6) |  |  | (11.9-28.6) |  | 4.1 | (2.2-7.5) |  |
| No | 99 | 17.2 | (12.3-23.5) |  | 23.0 | (16.6-30.9) |  | 7.3 | (3.4-14.8) |  |
| Total | 207 | 15.6 | (11.3-21.2) |  | 21.1 | (15.8-27.6) |  | 5.8 | (3.4-9.8) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Sample size for pregnant women designed to be only nationally representative.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {'Includes those who have completed 6-9 years of school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.8: Prevalence of Helicobacter Pylori Assessed in Stool Sample among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | H. pylori in Stool Sample ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 278 | 25.7 | (16.5-37.7) |  |
| Central | 333 | 17.9 | (14.0-22.6) |  |
| Western | 259 | 15.4 | (10.4-22.2) | 0.011 |
| Mid-western | 300 | 23.0 | (17.3-29.9) |  |
| Far-western | 353 | 17.9 | (13.3-23.6) |  |
| Ecological Region |  |  |  |  |
| Mountain | 250 | 23.3 | (17.0-30.9) |  |
| Hill | 644 | 18.1 | (14.7-22.2) | 0.318 |
| Terai | 629 | 20.5 | (15.8-26.2) |  |
| Location |  |  |  |  |
| Urban | 202 | 24.7 | (14.5-38.8) | 0.058 |
| Rural | 1,321 | 19.0 | (16.0-22.4) | 0.058 |
| Age, months |  |  |  |  |
| 6-8 | 63 | 10.4 | (3.7-25.9) |  |
| 9-11 | 81 | 7.7 | (3.3-17.0) |  |
| 12-17 | 163 | 9.0 | (5.8-13.8) |  |
| 18-23 | 146 | 13.3 | (8.5-20.2) | <. 001 |
| 24-35 | 348 | 22.2 | (16.5-29.2) |  |
| 36-47 | 362 | 22.7 | (17.6-28.7) |  |
| 48-59 | 360 | 26.2 | (21.6-31.5) |  |
| 6-23 | 453 | 10.4 | (8.1-13.3) | <0.001 |
| 24-59 | 1,070 | 23.7 | (20.1-27.8) | <0.001 |
| Sex |  |  |  |  |
| Male | 778 | 20.0 | (16.6-23.9) | 0.762 |
| Female | 745 | 19.4 | (15.8-23.6) | 0.762 |
| Maternal Education |  |  |  |  |
| No education ${ }^{\text {a }}$ | 203 | 24.0 | (19.7-28.8) |  |
| Primary ${ }^{\text {b }}$ | 163 | 24.7 | (17.3-33.8) | 0.001 |
| Some secondary ${ }^{\text {c }}$ | 215 | 11.7 | (8.3-16.4) | 0.001 |
| SLC and above ${ }^{\text {d }}$ | 209 | 14.1 | (9.6-20.3) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 422 | 22.5 | (18.9-26.6) |  |
| Second | 321 | 24.3 | (19.2-30.3) |  |
| Middle | 266 | 18.1 | (13.5-23.8) | 0.018 |
| Fourth | 279 | 14.4 | (10.3-19.9) |  |
| Highest | 235 | 19.0 | (13.4-26.2) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 141 | 18.4 | (11.4-28.3) |  |
| Hill Chhetri | 361 | 11.9 | (8.6-16.2) |  |
| Terai Brahmin/Chhetri | 40 | (18.3) | (10.0-31.0) |  |
| Other Terai caste | 116 | 19.5 | (13.1-27.9) |  |
| Hill Dalit | 245 | 24.4 | (18.4-31.7) | 0.009 |
| Terai Dalit | 81 | 26.0 | (11.4-48.8) | 0.009 |
| Newar | 47 | (22.7) | (11.6-39.6) |  |
| Hill Janajati | 344 | 19.8 | (16.3-23.8) |  |
| Terai Janajati | 98 | 20.1 | (12.5-30.9) |  |
| Muslim | 48 | (31.0) | (16.5-50.6) |  |
|  | 1,523 | 19.7 | (16.8-23.0) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ ELISA Dichotomous result providing a positive or negative result for H. pylori antigens.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\mathrm{b}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c I Includes the }}$ those who have completed 6-9 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.9: Prevalence of Helicobacter Pylori Assessed Using a Rapid Test Kit (RTK) in Whole Blood among Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Rapid Test Kit (RTK). Dichotomous result providing a positive or negative result for H. pylori antigens.
${ }^{\text {b }}$ Includes those who have never attended school.
${ }^{\text {c Includes those who have completed 0-5 years of school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
${ }^{\mathrm{e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 8.10: Prevalence of Helicobacter Pylori Assessed Using a Rapid Test Kit (RTK) in Whole Blood among Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P -value obtained from Pearson's chi-square test.
${ }^{\text {a R Rapid Test Kit (RTK). Dichotomous result providing a positive or negative result for H. pylori antigens. }}$
${ }^{\mathrm{b}}$ Includes those who have never attended school.
${ }^{\text {c Includes the }}$ those who have completed 0-5 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school
${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

Table 8.11: Prevalence of Helicobacter Pylori Assessed in Stool Sample among Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | H. pylori in Stool Sample ${ }^{\text {a }}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | N | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 388 | 47.4 | (37.9-57.0) |  |
| Central | 390 | 34.1 | (30.4-38.2) |  |
| Western | 381 | 31.7 | (27.0-36.7) | <0.001 |
| Mid-western | 389 | 49.9 | (43.1-56.6) |  |
| Far-western | 391 | 47.5 | (42.6-52.5) |  |
| Ecological Region |  |  |  |  |
| Mountain | 325 | 41.7 | (36.1-47.6) |  |
| Hill | 826 | 37.3 | (34.1-40.6) | 0.090 |
| Terai | 788 | 42.2 | (37.1-47.5) |  |
| Location |  |  |  |  |
| Urban | 269 | 42.4 | (33.8-51.6) | 398 |
| Rural | 1,670 | 39.6 | (36.4-43.0) | 0.398 |
| Age, years |  |  |  |  |
| 15-19 | 202 | 36.0 | (27.8-45.0) |  |
| 20-29 | 777 | 41.1 | (36.4-45.9) | . 479 |
| 30-39 | 612 | 38.7 | (34.9-42.6) | . 479 |
| 40-49 | 348 | 42.1 | (36.6-47.7) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |
| Yes | 536 | 39.4 | (34.8-44.2) |  |
| No | 208 | 40.7 | (33.9-47.9) | . 734 |
| Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 643 | 42.4 | (38.1-46.9) |  |
| Primary ${ }^{\text {c }}$ | 329 | 46.9 | (39.8-54.0) | 0.001 |
| Some secondary ${ }^{\text {d }}$ | 502 | 38.5 | (32.7-44.7) | 0.001 |
| SLC and above ${ }^{\text {e }}$ | 465 | 34.1 | (29.2-39.5) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 431 | 44.8 | (39.7-50.0) |  |
| Second | 416 | 39.7 | (33.8-45.8) |  |
| Middle | 377 | 38.2 | (33.5-43.1) | 0.472 |
| Fourth | 357 | 39.0 | (33.6-44.7) |  |
| Highest | 358 | 39.5 | (33.8-45.6) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 267 | 29.4 | (23.7-35.7) |  |
| Hill Chhetri | 460 | 36.7 | (32.0-41.6) |  |
| Terai Brahmin/Chhetri | 54 | 41.9 | (27.7-57.6) |  |
| Other Terai caste | 107 | 35.9 | (27.0-45.8) |  |
| Hill Dalit | 232 | 43.6 | (36.8-50.7) | <0.001 |
| Terai Dalit | 82 | 47.7 | (37.5-58.0) | <0.001 |
| Newar | 66 | 48.2 | (38.1-58.5) |  |
| Hill Janajati | 458 | 36.7 | (31.6-42.2) |  |
| Terai Janajati | 178 | 57.1 | (44.4-69.0) |  |
| Muslim | 33 | (61.4) | (43.7-76.5) |  |
| Total | 1,939 | 40.0 | (37.0-43.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |
| ${ }^{\text {a }}$ ELISA Dichotomous result providing a positive or negative result for H. pylori antigens. |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |
| ${ }^{\text {C }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |

Table 8.12: Prevalence of Visceral Leishmaniosis (Kala-azar) Assessed by Rapid Test Kit (RTK) among Children 6-59 Months and among Non-Pregnant Women 15-49 years

|  | N | Visceral Leishmaniasis (Kala-azar) by RTK ${ }^{\text {a }}$ |  |
| :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) |
| Children 6-59 months | 1,649 | 0.1 | (0.0-0.3) |
| Non-pregnant women 15-49 years | 2,136 | 0.4 | (0.2-0.9) |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data. <br> ${ }^{\text {a }}$ ITLEISH rapid diagnostic test kit using RK39 antigen to detect Leishmania donovani antibody. |  |  |  |

Table 8.13: Prevalence of Any Soil Transmitted Helminths (STHs) Assessed by Kato Katz in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Any Soil Transmitted Helminths (STHs) ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 279 \\ & 335 \\ & 260 \\ & 305 \\ & 356 \end{aligned}$ | $\begin{array}{r} 7.8 \\ 14.1 \\ 9.3 \\ 12.1 \\ 16.1 \end{array}$ | $\begin{array}{r} (4.5-13.1) \\ (11.2-17.6) \\ (5.3-15.9) \\ (9.4-15.6) \\ (11.4-22.2) \end{array}$ | 0.022 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 253 \\ & 650 \\ & 632 \end{aligned}$ | $\begin{aligned} & 12.0 \\ & 12.4 \\ & 11.5 \\ & \hline \end{aligned}$ | $\begin{array}{r} (7.5-18.6) \\ (10.2-14.9) \\ (8.7-15.1) \\ \hline \end{array}$ | 0.859 |
| Location Urban Rural | $\begin{array}{r} 204 \\ 1,331 \end{array}$ | $\begin{aligned} & 12.6 \\ & 11.8 \end{aligned}$ | $\begin{array}{r} (8.3-18.9) \\ (10.0-14.0) \\ \hline \end{array}$ | 0.758 |
| $\begin{array}{\|c} \hline \text { Age, months } \\ 6-8 \\ 9-11 \\ 12-17 \\ 18-23 \\ 24-35 \\ 36-47 \\ 48-59 \\ \\ 6-23 \\ 24-59 \end{array}$ | $\begin{array}{r} 65 \\ 81 \\ 163 \\ 147 \\ 352 \\ 365 \\ 362 \\ \\ 456 \\ 1,079 \end{array}$ | $\begin{array}{r} 8.0 \\ 5.6 \\ 9.6 \\ 10.8 \\ 11.1 \\ 16.1 \\ 12.1 \\ \\ 9.1 \\ 13.1 \end{array}$ | $\begin{array}{r} (2.7-21.5) \\ (2.3-13.3) \\ (5.4-16.4) \\ (7.3-15.8) \\ (7.8-15.5) \\ (12.8-20.0) \\ (8.8-16.5) \\ (6.8-12.2) \\ (10.9-15.8) \end{array}$ | $\begin{aligned} & 0.071 \\ & \\ & 0.023 \end{aligned}$ |
| Sex <br> Male <br> Female | $\begin{aligned} & 785 \\ & 750 \end{aligned}$ | $\begin{aligned} & 12.9 \\ & 10.8 \\ & \hline \end{aligned}$ | $\begin{array}{r} (10.5-15.7) \\ (8.5-13.6) \\ \hline \end{array}$ | 0.204 |
| Maternal Education <br> No education ${ }^{\text {b }}$ <br> Primary ${ }^{\text {c }}$ <br> Some secondary ${ }^{\text {d }}$ <br> SLC and above ${ }^{e}$ | $\begin{aligned} & 203 \\ & 164 \\ & 218 \\ & 210 \\ & \hline \end{aligned}$ | $\begin{array}{r} 16.5 \\ 9.9 \\ 15.2 \\ 11.5 \end{array}$ | $\begin{array}{r} (12.7-21.1) \\ (5.3-17.5) \\ (10.8-21.0) \\ (7.1-17.9) \end{array}$ | 0.235 |
| Wealth Quintile Lowest Second Middle Fourth Highest | $\begin{aligned} & 425 \\ & 325 \\ & 267 \\ & 282 \\ & 236 \end{aligned}$ | $\begin{array}{r} 12.2 \\ 10.9 \\ 12.7 \\ 13.9 \\ 9.8 \end{array}$ | $\begin{aligned} & (9.5-15.6) \\ & (7.7-15.3) \\ & (8.8-18.0) \\ & (9.6-19.9) \\ & (6.2-15.3) \\ & \hline \end{aligned}$ | 0.580 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 143 \\ 364 \\ 40 \\ 116 \\ 247 \\ 81 \\ 47 \\ 347 \\ 99 \\ 49 \\ \hline \end{array}$ | 9.4 11.6 $(8.7)$ 11.1 7.0 19.2 $(18.9)$ 12.2 10.3 $(19.4)$ | $(5.9-14.7)$ $(8.6-15.4)$ $(2.6-25.0)$ $(6.3-19.0)$ $(4.6-10.5)$ $(12.6-28.2)$ $(8.2-37.9)$ $(9.8-15.0)$ $(5.2-19.4)$ $(9.9-34.4)$ | 0.043 |
| Dewormed in last 6 months Yes <br> No | $\begin{array}{r} 1,256 \\ 274 \\ \hline \end{array}$ | $\begin{aligned} & 12.1 \\ & 11.5 \\ & \hline \end{aligned}$ | $\begin{array}{r} (10.2-14.4) \\ (7.9-16.4) \\ \hline \end{array}$ | 0.593 |
| Total | 1,535 | 11.9 | (10.2-14.0) |  |

[^28]Table 8.14: Prevalence of Light Intensity Soil Transmitted Helminths (STHs) Assessed by Kato Katz in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Light Intensity of Soil Transmitted Helminths (STHs) ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Ascaris lumbricoides |  |  | Trichuris trichura |  |  | Hookworms |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 279 | 6.7 | (3.6-12.0) |  | 0.9 | (0.2-3.2) |  | 0.2 | (0.0-1.6) |  |
| Central | 335 | 12.2 | (9.2-15.9) |  | 1.6 | (1.4-1.8) |  | 2.9 | (1.5-5.5) |  |
| Western | 260 | 9.3 | (5.3-15.9) | 0.019 | 0.0 | - | 0.115 | 0.0 |  | 0.001 |
| Mid-western | 305 | 10.3 | (7.6-13.7) |  | 0.3 | (0.0-2.1) |  | 1.6 | (0.9-2.7) |  |
| Far-western | 356 | 16.1 | (11.4-22.2) |  | 0.0 | - |  | 0.0 | - |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 253 |  | (5.2-15.5) |  | 1.3 | (0.4-4.0) |  | 1.6 | (0.6-3.7) |  |
| Hill | 650 | 11.7 | (9.6-14.3) | 0.536 | 1.4 | (1.3-1.5) | 0.050 | 1.5 | (1.2-1.7) | 0.852 |
| Terai | 632 | 10.2 | (7.4-13.8) |  | 0.2 | (0.0-1.5) |  | 1.2 | (0.3-4.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 204 | 10.1 | (5.4-18.2) | 0.732 | 0.8 | (0.1-5.3) | 0.749 | 0.0 | - | 0.082 |
| Rural | 1331 | 10.8 | (8.9-13.0) |  | 0.8 | (0.7-1.0) | 崖 | 1.5 | (0.9-2.7) | , 082 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 65 |  | (2.7-21.5) |  | 0.0 | - |  | 0.0 | - |  |
| 9-11 | 81 |  | (2.3-13.3) |  | 0.0 | - |  | 0.0 | - |  |
| 12-17 | 163 | 8.6 | (4.5-15.8) |  | 0.0 | - |  | 1.0 | (0.3-3.0) |  |
| 18-23 | 147 | 9.2 | (6.1-13.7) | 0.155 | 1.4 | (0.3-6.4) | 0.180 | 1.7 | (1.4-2.0) | 0.262 |
| 24-35 | 352 | 10.1 | (7.3-13.8) |  | 0.0 | - |  | 0.9 | (0.8-1.0) |  |
| 36-47 | 365 | 14.3 | (11.1-18.2) |  | 1.4 | (1.1-1.8) |  | 2.6 | (1.1-5.9) |  |
| 48-59 | 362 | 10.9 | (7.8-15.0) |  | 1.4 | (1.1-1.9) |  | 1.1 | (0.3-4.1) |  |
| 6-23 | 456 | 8.2 | (5.9-11.4) | . 038 | 0.4 | (0.1-2.1) | 305 | 0.9 | (0.6-1.4) | 263 |
| 24-59 | 1079 | 11.8 | (9.6-14.5) | . 038 | 1.0 | (0.8-1.2) | 0.305 | 1.5 | (0.7-3.2) | 263 |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 785 | 11.4 | (9.3-14.0) | 366 | 1.1 | (0.8-1.6) | 155 | 1.2 | (0.4-3.2) | 517 |
| Female | 750 | 9.9 | (7.7-12.7) | , 366 | 0.5 | (0.3-0.7) | 155 | 1.5 | (0.8-3.0) | , 517 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 203 | 14.4 | (10.7-19.0) |  | 4.3 | (3.3-5.6) |  | 2.7 | (2.0-3.5) |  |
| Primary ${ }^{\text {c }}$ | 164 |  | (5.0-17.3) | 0.407 | 0.3 | (0.0-2.3) | <0.001 | 0.0 | - | 0.078 |
| Some secondary ${ }^{\text {d }}$ | 218 | 14.1 | (10.1-19.2) | 0.407 | 0.0 | - | <0.001 | 2.5 | (1.0-6.1) | 0.078 |
| SLC and above ${ }^{\text {e }}$ | 210 | 11.0 | (6.7-17.5) |  | 0.0 | - |  | 0.4 | (0.1-1.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 425 | 10.3 | (7.6-13.8) |  | 2.7 | (2.1-3.4) |  | 1.4 | (1.0-1.9) |  |
| Second | 325 | 10.6 | (7.4-15.0) |  | 0.0 | - |  | 2.2 | (0.8-6.0) |  |
| Middle | 267 | 11.6 | (7.9-16.8) | 0.809 | 1.3 | (0.6-3.0) | <0.001 | 1.5 | (1.0-2.3) | 0.351 |
| Fourth | 282 | 12.1 | (8.4-17.1) |  | 0.0 | - |  | 0.8 | (0.1-5.7) |  |
| Highest | 236 | 9.0 | (5.6-14.2) |  | 0.0 | - |  | 0.8 | (0.1-5.8) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 143 |  | (5.9-14.7) |  | 0.0 | - |  | 0.0 | - |  |
| Hill Chhetri | 364 | 11.1 | (8.2-15.0) |  | 0.0 | - |  | 0.5 | (0.2-1.2) |  |
| Terai Brahmin/Chhetri | 40 | (8.7) | (2.6-25.0) |  | (0.0) | - |  | (0.0) | - |  |
| Other Terai caste | 116 | 8.8 | (4.0-18.4) |  | 0.0 | - |  | 4.0 | (1.2-12.4) |  |
| Hill Dalit | 247 | 5.8 | (3.7-8.9) | 0.037 | 0.0 | - | 0.001 | 1.2 | (0.4-3.5) | 0.012 |
| Terai Dalit | 81 | 17.8 | (10.8-27.8) | 0.037 | 1.4 | (0.2-9.1) | 0.001 | 0.0 | - | 0.012 |
| Newar | 47 | (18.9) | (8.2-37.9) |  | (0.0) | - |  | (0.0) | - |  |
| Hill Janajati | 347 |  | (8.7-13.6) |  | 3.0 | (2.5-3.7) |  | 2.3 | (1.9-2.7) |  |
| Terai Janajati | 99 | 9.6 | (4.7-18.8) |  | 0.0 | - |  | 0.7 | (0.1-4.9) |  |
| Muslim | 49 | (14.1) | (6.2-29.1) |  | (0.0) | - |  | (0.0) | - |  |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |
| Yes | 1,256 | 10.8 | (8.9-13.1) | 0.654 | 0.9 | (0.7-1.3) | 0.568 | 1.6 | (0.9-2.9) | 266 |
| No | 274 | 10.7 | (7.2-15.6) | 0.654 | 0.4 | (0.1-1.4) | 0.568 | 0.4 | (0.1-1.8) | 266 |
| Total | 1,535 | 10.7 | (9.0-12.8) |  | 0.8 | (0.6-1.1) |  | 1.4 | (0.8-2.4) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |
| Sample sizes might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ WHO, 2002. Classes of intensity are based on epg (eggs per gram) of stool according to WHO guidelines. Light intensity: Ascaris lumbricoides: 1-4999 epg; Trichuris trichura: 1-999 epg; Hookworms: 1-1999 epg |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c I Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |

Table 8.15: Prevalence of Any Soil Transmitted Helminths (STHs) Assessed by Kato Katzin NonPregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Any Soil Transmitted Helminths (STHs) ${ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |
| Eastern | 398 | 7.5 | (3.8-14.1) |  |
| Central | 410 | 22.4 | (17.1-28.8) |  |
| Western | 392 | 21.3 | (17.0-26.5) | <0.001 |
| Mid-western | 404 | 19.3 | (15.3-23.9) |  |
| Far-western | 408 | 23.3 | (16.8-31.5) |  |
| Ecological Region |  |  |  |  |
| Mountain | 341 | 15.2 | (11.8-19.3) |  |
| Hill | 862 | 20.7 | (17.9-23.7) | 0.088 |
| Terai | 809 | 17.1 | (12.8-22.3) |  |
| Location |  |  |  |  |
| Urban | 282 | 20.2 | (13.7-28.8) |  |
| Rural | 1730 | 18.3 | (15.5-21.5) | . 413 |
| Age, years |  |  |  |  |
| 15-19 | 212 | 13.0 | (7.3-22.0) |  |
| 20-29 | 804 | 21.4 | (18.2-25.1) | 025 |
| 30-39 | 638 | 17.4 | (13.7-21.9) | . 025 |
| 40-49 | 358 | 16.9 | (12.2-23.0) |  |
| Lactating Status |  |  |  |  |
| (among those who had given birth in the last 5 years) |  |  |  |  |
| Yes | 556 | 22.3 | (18.5-26.6) | 787 |
| No | 219 | 21.5 | (14.5-30.5) | \% |
| Education |  |  |  |  |
| No education ${ }^{\text {b }}$ | 665 | 18.4 | (14.1-23.7) |  |
| Primary ${ }^{\text {c }}$ | 340 | 22.7 | (17.8-28.4) | 0.156 |
| Some secondary ${ }^{\text {d }}$ | 519 | 16.8 | (12.7-21.9) | 0.156 |
| SLC and above ${ }^{\text {e }}$ | 488 | 17.9 | (14.2-22.2) |  |
| Wealth Quintile |  |  |  |  |
| Lowest | 451 | 15.6 | (12.4-19.5) |  |
| Second | 430 | 17.3 | (13.7-21.8) |  |
| Middle | 388 | 18.8 | (13.4-25.6) | 0.477 |
| Fourth | 368 | 19.7 | (15.0-25.5) |  |
| Highest | 375 | 20.2 | (15.0-26.5) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 273 | 20.1 | (15.2-26.1) |  |
| Hill Chhetri | 485 | 20.5 | (16.9-24.8) |  |
| Terai Brahmin/Chhetri | 57 | 8.6 | (2.9-22.8) |  |
| Other Terai caste | 110 | 21.9 | (11.5-37.7) |  |
| Hill Dalit | 243 | 19.2 | (13.2-27.0) | <0.001 |
| Terai Dalit | 85 | 21.6 | (10.5-39.3) | <0.001 |
| Newar | 69 | 26.8 | (19.5-35.6) |  |
| Hill Janajati | 473 | 16.0 | (12.6-20.2) |  |
| Terai Janajati | 181 | 9.3 | (5.1-16.2) |  |
| Muslim | 34 | (34.3) | (21.6-49.7) |  |
| Dewormed in last 6 months |  |  |  |  |
| Yes | 938 | 16.1 | (12.6-20.3) | 40 |
| No | 1,072 | 20.2 | (17.1-23.8) | 㖪 |
| Total | 2,012 | 18.6 | (16.0-21.4) |  |

[^29]Table 8.16: Prevalence of Light Intensity Soil Transmitted Helminths (STHs) Assessed by Kato Katzin Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Light Intensity of Soil Transmitted Helminths (STHs) ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Ascaris lumbricoides |  |  | Trichuris trichura |  |  | Hookworms |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 398 |  | (3.6-13.8) |  | 0.1 | (0.0-1.1) |  | 0.2 | (0.0-1.2) |  |
| Central | 410 | 20.9 | (15.7-27.3) |  | 0.0 | (0.0-0.3) |  | 2.1 | (1.0-4.4) |  |
| Western | 392 | 20.9 | (16.6-26.1) | <0.001 | 0.4 | (0.4-0.4) | 0.249 | 0.0 | - | 0.001 |
| Mid-western | 404 |  | (14.8-23.2) |  | 0.0 | - |  | 0.6 | (0.2-1.9) |  |
| Far-western | 408 | 23.3 | (16.8-31.5) |  | 0.0 | - |  | 0.0 | - |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 341 |  | (10.8-17.8) |  | 0.5 | (0.1-3.7) |  | 1.5 | (0.4-5.1) |  |
| Hill | 862 | 20.1 | (17.4-23.1) | 0.048 | 0.2 | (0.1-0.3) | 0.076 | 0.6 | (0.4-0.9) | 0.364 |
| Terai | 809 | 16.2 | (12.1-21.5) |  | 0.0 | - |  | 1.0 | (0.3-3.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 282 |  | (13.6-28.7) | 301 | 0.1 | (0.0-0.9) | 0.574 | 0.0 |  | 100 |
| Rural | 1730 | 17.5 | (14.7-20.6) | , 301 | 0.1 | (0.1-0.2) | 0.574 | 1.0 | (0.5-1.9) | . 100 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 212 |  | (7.3-22.0) |  | 0.0 | - |  | 0.0 | - |  |
| 20-29 | 804 |  | (17.6-24.4) | 0.024 | 0.2 | (0.2-0.3) | 0.40 | 1.0 | (0.5-1.8) | 0.490 |
| 30-39 | 638 |  | (12.7-20.7) | . 024 | 0.0 | (0.0-0.4) | . 408 | 1.1 | (0.5-2.3) | 0.490 |
| 40-49 | 358 | 16.3 | (11.6-22.4) |  | 0.1 | (0.0-0.7) |  | 0.6 | (0.1-4.3) |  |
| Lactating Status (among those who had given birth |  |  |  |  |  |  |  |  |  |  |
| in the last 5 years) |  |  |  |  |  |  |  |  |  |  |
| Yes | 556 |  | (17.2-25.8) | 0.942 | 0.1 | (0.0-0.5) | 0.183 | 1.0 | (0.3-3.1) | 0.884 |
| No | 219 | 20.8 | (13.9-29.9) | 0.942 | 0.7 | (0.6-0.8) | 0.183 | 1.1 | (0.7-1.7) | 0.884 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 665 |  | (13.5-22.0) |  | 0.1 | (0.0-0.4) |  | 1.6 | (0.5-5.4) |  |
| Primary ${ }^{\text {c }}$ | 340 |  | (17.0-27.7) | 179 | 0.1 | (0.0-0.7) | 0.123 | 0.7 | (0.5-1.0) | 0.094 |
| Some secondary ${ }^{\text {d }}$ | 519 |  | (12.1-21.4) | 179 | 0.4 | (0.3-0.5) | 0.123 | 0.3 | (0.0-2.1) | 0.094 |
| SLC and above ${ }^{\text {e }}$ | 488 | 17.3 | (13.7-21.6) |  | 0.0 | - |  | 0.7 | (0.1-2.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 451 |  | (11.2-17.9) |  | 0.2 | (0.0-1.5) |  | 1.3 | (0.7-2.3) |  |
| Second | 430 | 17.1 | (13.5-21.5) |  | 0.0 | - |  | 0.2 | (0.1-0.8) |  |
| Middle | 388 | 18.4 | (13.0-25.3) | 0.402 | 0.4 | (0.3-0.4) | 0.212 | 1.1 | (0.4-2.9) | 0.560 |
| Fourth | 368 | 18.6 | (14.0-24.2) |  | 0.1 | (0.0-0.6) |  | 1.1 | (0.4-3.1) |  |
| Highest | 375 | 19.5 | (14.4-25.8) |  | 0.0 | - |  | 0.7 | (0.2-2.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 273 | 20.1 | (15.2-26.1) |  | 0.0 | - |  | 0.0 | - |  |
| Hill Chhetri | 485 | 20.5 | (16.9-24.8) |  | 0.0 | - |  | 0.2 | (0.0-1.1) |  |
| Terai Brahmin/Chhetri | 57 |  | (2.9-22.8) |  | 0.0 | - |  | 0.0 | - |  |
| Other Terai caste | 110 | 18.7 | (9.4-33.9) |  | 0.0 | - |  | 4.3 | (0.9-18.3) |  |
| Hill Dalit | 243 |  | (12.3-25.3) | 001 | 0.9 | (0.7-1.1) | 0.191 | 0.5 | (0.1-3.0) | <0.001 |
| Terai Dalit | 85 |  | (10.5-39.3) | 001 | 0.0 | - | 0.191 | 0.0 | - | <0.001 |
| Newar | 69 | 26.8 | (19.5-35.6) |  | 0.0 |  |  | 0.0 | - |  |
| Hill Janajati | 473 | 14.4 | (11.0-18.7) |  | 0.2 | (0.0-1.0) |  | 1.9 | (1.1-3.2) |  |
| Terai Janajati | 181 |  | (5.1-16.2) |  | 0.0 | - |  | 0.0 | - |  |
| Muslim | 34 | (34.3) | (21.6-49.7) |  | (0.0) | - |  | (0.0) | - |  |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |
| Yes | 938 | 15.8 | (12.4-20.0) |  | 0.2 | (0.2-0.3) |  | 0.1 | (0.0-0.5) |  |
| No | 1,072 | 19.2 | (16.1-22.7) | 104 | 0.1 | (0.0-0.4) | 628 | 1.3 | (0.7-2.7) | 0.017 |
| Total | 2,012 | 17.8 | (15.3-20.6) |  | 0.1 | (0.1-0.2) |  | 0.9 | (0.4-1.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ WHO, 2002. Classes of intensity are based on epg (eggs per gram) of stool according to WHO guidelines. Light intensity: Ascaris lumbricoides: 1-4999 epg; Trichuris trichura: 1-999 epg; Hookworms: 1-1999 epg |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c I Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |

## CHAPTER 9

## Blood Disorder Status

Inherited blood disorders, such as alpha-thalassemia, beta-thalassemia, sickle cell disease, hemoglobin E and glucose-6-phosphate dehydrogenase (G6PD) were assessed among children 6-59 months and non-pregnant women 15-49 years. Blood disorders can cause anemia and may influence other indicators of micronutrient status. Enzyme-linked immunosorbent assay (ELISA) was used to test for blood disorders in NMSS as representative prevalence of these disorders have not previously been reported in the country. Both trait and disease for blood disorders were assessed (e.g., sickle cell trait (HbAS) and sickle cell diseases (HBSS) in the survey. However, ELISA cannot distinguish between species of blood disorders like DNA genetic testing can. To assess the blood disorders prevalence, a complete blood count (CBC) was carried out to determine the types and numbers of cells in the blood.

### 9.1 Prevalence of Blood Disorder among Children 6-59 Months

The prevalence of inherited blood disorders among children 6-59 months are summarized in Table 9.1 and 9.2. Overall, two percent of children were carriers for alpha-thalassemia, five percent had beta-thalassemia, less than one percent were carriers for sickle cell, or had sickle cell trait (HbAS) ( 0.3 percent) and around one percent ( 0.9 percent) had Hemoglobin E. A total of 18 percent were affected by Glucose-6-phosphate Dehydrogenate (G6PD) deficiency. Betathalassemia minor ranged from about two percent in the Mid-western and the Far-western regions to eight percent in the Central region. The prevalence of beta-thalassemia minor across the ecological zones varied from seven percent in the Terai to four percent in the Hill and one percent in the Mountain. Beta-thalassemia minor also varied by maternal education and by wealth quintile. The prevalence of G6PD deficiency ranged from around 15 percent in the Midwestern region and the Far-western region to 25 percent in the Western region. Further, G6PD was identified among 23 percent of children in the Terai and 10 percent of those in the Mountains. G6PD was 23 percent among young children in the urban areas and 17 percent in the rural areas, and also varied by maternal education and wealth quintile.

### 9.2 Prevalence of Blood Disorder among Non-Pregnant Women 15-49 Years

The prevalence of inherited blood disorders among non-pregnant women 15-49 years are summarized in Table 9.3 and 9.4. Overall, less than one percent ( 0.7 percent) of non-pregnant women were found to be carriers for alpha-thalassemia, three percent had beta-thalassemia minor, less than one percent ( 0.7 percent) were carriers for sickle cell, or had sickle cell trait (HbAS) and around two percent (1.9 percent) had Hemoglobin E. A total of 14 percent were affected by G6PD deficiency. Beta-thalassemia minor varied by ecological zone ranging from one percent in the Mountains to five percent in the Terai. It also varied by lactation status of women ranging from two percent among lactating women to eight percent among non-lactating women, by wealth quintile ranging from one percent among women in the lowest quintile to eight percent among those in the fourth quintile and ethnicity of the women ranging from one percent among Hill Chhetri caste group to 10 percent among Terai Janajati Caste group. The prevalence of G6PD deficiency among non-pregnant women 15-49 years was 18 percent in the Terai region and 24 percent among the other Terai caste group. G6PD also varied by age and was 19 percent among women 15-19 years and 10 percent among women 40-49 years age group.

## List of Tables

For more information on the blood disorder status, see the following tables:

Table 9.1: Prevalence of Alpha Thalassemia, Beta Thalassemia in Children 6-59 Months
Table 9.2: Prevalence of Sickle Cell, HbE and G6PD Deficiency in Children 6-59 Months
Table 9.3: Prevalence of Alpha Thalassemia, Beta Thalassemia and Other Blood Disorders in NonPregnant Women 15-49 Years
Table 9.4: Prevalence of Sickle Cell, HbE and G6PD Deficiency in Non-Pregnant Women 15-49 Years

Table 9.1: Prevalence of Alpha Thalassemia and Beta Thalassemia in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Blood Disorder ${ }^{\text {a, }}$, |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\alpha$-Thalassemia* |  |  | $\beta$-Thalassemia minor ${ }^{\circ}$ |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 312 | 0.7 | (0.1-3.1) |  | 4.5 | (2.4-8.1) |  |
| Central | 338 | 2.0 | (1.0-3.7) |  | 7.6 | (4.2-13.5) |  |
| Western | 275 | 2.0 | (0.9-4.3) | 0.171 | 6.2 | (3.0-12.2) | 0.002 |
| Mid-western | 326 | 3.7 | (1.8-7.5) |  | 1.5 | (0.4-5.3) |  |
| Far-western | 359 | 2.6 | (1.4-4.9) |  | 2.2 | (1.1-4.2) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 260 | 1.5 | (0.4-5.9) |  | 0.7 | (0.1-4.6) |  |
| Hill | 676 | 2.5 | (1.6-3.9) | 0.446 | 3.6 | (2.1-6.0) | <0.001 |
| Terai | 674 | 1.7 | (0.9-3.1) |  | 7.4 | (4.6-11.8) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 204 | 1.5 | (0.4-6.0) | 0.570 | 4.8 | (1.3-15.9) | 0.795 |
| Rural | 1,406 | 2.1 | (1.4-3.0) | 0.570 | 5.3 | (3.6-7.8) | 0.795 |
| Age, months |  |  |  |  |  |  |  |
| 6-8 | 63 | 4.1 | (1.1-14.2) |  | 3.4 | (0.5-20.8) |  |
| 9-11 | 81 | 5.1 | (1.8-13.7) |  | 0.9 | (0.1-6.1) |  |
| 12-17 | 160 | 6.0 | (3.4-10.7) |  | 5.4 | (2.5-11.2) |  |
| 18-23 | 150 | 3.1 | (1.4-6.6) | <0.001 | 4.9 | (1.9-11.6) | 0.673 |
| 24-35 | 378 | 0.9 | (0.3-2.6) |  | 6.1 | (3.3-10.9) |  |
| 36-47 | 394 | 1.7 | (0.8-3.6) |  | 6.0 | (2.7-12.9) |  |
| 48-59 | 384 | 0.2 | (0.0-0.7) |  | 5.1 | (3.4-7.5) |  |
| 6-23 | 454 | 4.6 | (3.0-7.0) | $<0.001$ | 4.2 | (2.4-7.2) | 0.228 |
| 24-59 | 1,156 | 0.9 | (0.5-1.7) | <0.001 | 5.7 | (3.8-8.6) | 0.228 |
| Sex |  |  |  |  |  |  |  |
| Male | 816 | 2.2 | (1.5-3.5) | 0.515 | 5.3 | (3.5-7.7) | 0.976 |
| Female | 794 | 1.7 | (0.9-3.1) | 0.515 | 5.3 | (3.3-8.4) | 0.976 |
| Maternal Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 216 | 2.7 | (1.2-5.8) |  | 11.2 | (5.6-21.1) |  |
| Primary ${ }^{\text {c }}$ | 165 | 2.9 | (0.9-8.9) | 0.967 | 1.5 | (0.5-4.9) | 0.001 |
| Some secondary ${ }^{\text {d }}$ | 235 | 2.0 | (1.3-3.2) | 0.967 | 4.1 | (1.9-8.8) | 0.001 |
| SLC and above ${ }^{\text {e }}$ | 212 | 2.6 | (0.8-7.6) |  | 7.6 | (3.8-14.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 454 | 1.8 | (0.9-3.5) |  | 2.5 | (1.5-4.2) |  |
| Second | 331 | 1.7 | (1.0-2.8) |  | 4.3 | (2.6-7.0) |  |
| Middle | 287 | 2.4 | (1.2-4.6) | 0.583 | 7.0 | (3.8-12.6) | 0.030 |
| Fourth | 294 | 1.2 | (0.4-3.7) |  | 7.4 | (4.0-13.2) |  |
| Highest | 244 | 3.0 | (1.4-6.5) |  | 5.4 | (2.7-10.6) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 146 | 0.6 | (0.1-2.0) |  | 7.9 | (3.9-15.7) |  |
| Hill Chhetri | 375 | 1.1 | (0.4-3.4) |  | 4.5 | (2.3-8.9) |  |
| Terai Brahmin/Chhetri | 41 | (0.0) | - |  | (3.9) | (0.5-24.5) |  |
| Other Terai caste | 127 | 0.0 | - |  | 6.1 | (1.4-22.5) |  |
| Hill Dalit | 260 | 4.1 | (2.6-6.3) | 0.001 | 1.9 | (0.6-6.2) | 0.063 |
| Terai Dalit | 82 | 1.7 | (0.3-8.7) | 0.001 | 9.3 | (3.1-24.7) | 0.063 |
| Newar | 49 | (7.5) | (1.9-25.1) |  | (0.0) | - |  |
| Hill Janajati | 368 | 1.5 | (0.7-3.3) |  | 4.4 | (2.6-7.5) |  |
| Terai Janajati | 112 | 5.3 | (2.3-11.8) |  | 8.8 | (4.6-16.3) |  |
| Muslim | 48 | (6.6) | (2.0-19.9) |  | (7.0) | (1.6-26.6) |  |
| Total | 1,610 | 2.0 | (1.4-2.9) |  | 5.3 | (3.6-7.6) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample sizes might vary slightly due to missing data. <br> HbAS (Sickle Cell Trait): Hemoglobin S (Carrier for Sickle Cell) <br> HbE: Hemoglobin E <br> G6PD: Glucose-6-phosphate Dehydrogenate, which is defined as deficiency when its value is in the range of 0-49 U/dL. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Assessed by ELISA <br> $\wedge$ Other blood disorders not shown (prevalence $0.5 \%$ and $95 \%$ CI (0.3-1.1)) and may include Hemoglobin D Punjab, Hereditary persistent of fetal hemoglobin, $\alpha$ chain variant possibly Hemoglobin J, Abnormal hemoglobin unknown and $\beta$ chain variant unknown. <br> *Some co-existed with hemoglobin S (HbAS) \&Hemoglobin E (HbE) <br> ${ }^{\circ}$ Some co-existed with $\mathrm{HbAS} \&$ others. <br> ${ }^{\text {b }}$ Includes those who have never attended school. <br> ${ }^{\text {'I Includes those who have completed 0-5 years of school. }}$ <br> ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |
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Table 9.2: Prevalence of Sickle Cell, HbE and G6PD Deficiency in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Blood Disorder ${ }^{\text {a }}$ |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | HbAS (Sickle Cell)* |  | HbE ${ }^{\circ}$ |  | G6PD Deficiency |  |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |
| Eastern | 312 | 0.0 | - | 2.8 | (1.3-5.7) | 16.7 | (12.3-22.3) |  |
| Central | 338 | 0.0 | - | 0.3 | (0.0-2.4) | 17.2 | (12.9-22.6) |  |
| Western | 275 | 0.5 | (0.1-4.0) | 0.0 |  | 24.5 | (18.3-31.9) | 0.030 |
| Mid-western | 326 | 0.9 | (0.3-2.7) | 0.9 | (0.1-6.2) | 15.6 | (11.8-20.4) |  |
| Far-western | 359 | 1.0 | (0.4-2.8) | 0.3 | (0.0-1.8) | 14.9 | (11.1-19.8) |  |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 260 | 0.0 | - | 0.0 | - | 10.0 | (5.0-18.9) |  |
| Hill | 676 | 0.1 | (0.0-0.7) | 0.7 | (0.3-1.9) | 13.5 | (11.1-16.4) | <0.001 |
| Terai | 674 | 0.6 | (0.2-1.3) | 1.1 | (0.5-2.5) | 22.8 | (18.8-27.3) |  |
| Location |  |  |  |  |  |  |  |  |
| Urban | 204 | 0.0 | - | 0.0 | - | 23.3 | (14.6-35.0) | 0.037 |
| Rural | 1,406 | 0.4 | (0.2-0.8) | 1.0 | (0.5-1.8) | 17.1 | (14.9-19.6) | 0.037 |
| Age, months |  |  |  |  |  |  |  |  |
| 6-8 | 63 | 0.7 | (0.1-4.6) | 3.6 | (0.9-13.1) | 22.1 | (13.4-34.2) |  |
| 9-11 | 81 | 0.4 | (0.1-3.1) | 0.0 | - | 22.4 | (13.1-35.7) |  |
| 12-17 | 160 | 0.7 | (0.2-3.0) | 1.4 | (0.3-5.8) | 20.0 | (14.2-27.4) |  |
| 18-23 | 150 | 0.0 | - | 0.4 | (0.4-0.5) | 19.2 | (14.1-25.5) | 0.402 |
| 24-35 | 378 | 0.2 | (0.0-1.5) | 0.7 | (0.2-3.4) | 18.7 | (15.3-22.7) |  |
| 36-47 | 394 | 0.3 | (0.1-1.3) | 1.3 | (0.4-3.9) | 18.0 | (13.8-23.1) |  |
| 48-59 | 384 | 0.3 | (0.1-1.3) | 0.2 | (0.0-1.3) | 14.0 | (10.3-18.8) |  |
| 6-23 | 454 | 0.4 | (0.2-1.1) | 1.2 | (0.5-2.8) | 20.4 | (16.1-25.6) |  |
| 24-59 | 1,156 | 0.3 | (0.1-0.9) | 0.7 | (0.3-1.8) | 16.9 | (14.4-19.6) | 0.095 |
| Sex |  |  |  |  |  |  |  |  |
| Male | 816 | 0.4 | (0.2-0.9) | 0.6 | (0.3-1.6) | 16.8 | (13.7-20.4) | 208 |
| Female | 794 | 0.2 | (0.1-0.8) | 1.1 | (0.5-2.6) | 19.2 | (16.3-22.6) | . 208 |
| Maternal Education |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 216 | 0.0 | - | 0.3 | (0.0-2.4) | 16.8 | (11.1-24.5) |  |
| Primary ${ }^{\text {c }}$ | 165 | 0.5 | (0.1-3.6) | 1.3 | (0.2-8.7) | 21.8 | (16.1-28.8) | 0.037 |
| Some secondary ${ }^{\text {d }}$ | 235 | 0.3 | (0.0-2.0) | 2.0 | (0.9-4.3) | 11.5 | (8.2-15.9) | 0.037 |
| SLC and above ${ }^{\text {e }}$ | 212 | 0.3 | (0.0-1.9) | 0.3 | (0.3-0.4) | 13.3 | (9.5-18.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 454 | 0.2 | (0.0-1.4) | 0.4 | (0.1-2.8) | 17.8 | (14.0-22.3) |  |
| Second | 331 | 0.5 | (0.1-1.6) | 0.6 | (0.2-1.8) | 17.7 | (13.4-22.9) |  |
| Middle | 287 | 0.2 | (0.0-1.4) | 1.3 | (0.4-4.1) | 13.4 | (9.6-18.4) | 0.081 |
| Fourth | 294 | 0.4 | (0.1-1.7) | 1.5 | (0.5-4.3) | 22.0 | (16.4-28.8) |  |
| Highest | 244 | 0.3 | (0.1-1.4) | 0.7 | (0.1-4.7) | 18.6 | (11.8-27.8) |  |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 146 | 0.0 | - | 0.3 | (0.0-2.0) | 16.3 | (9.6-26.3) |  |
| Hill Chhetri | 375 | 0.2 | (0.0-1.7) | 0.0 | - | 12.5 | (9.9-15.8) |  |
| Terai Brahmin/Chhetri | 41 | (0.0) | - | (0.0) | - | (16.1) | (8.7-28.0) |  |
| Other Terai caste | 127 | 0.0 | - | 0.0 | - | 25.8 | (15.9-38.9) |  |
| Hill Dalit | 260 | 0.0 | - | 0.0 | - | 14.8 | (10.0-21.3) | $<0.001$ |
| Terai Dalit | 82 | 0.0 | - | 0.0 | - | 20.9 | (11.7-34.5) | <0.001 |
| Newar | 49 | (0.0) |  | (0.0) | - | (7.6) | (2.7-19.3) |  |
| Hill Janajati | 368 | 0.0 | - | 1.3 | (0.5-3.5) | 15.0 | (12.4-18.1) |  |
| Terai Janajati | 112 | 4.7 | (1.9-10.8) | 7.0 | (3.0-15.3) | 28.7 | (19.1-40.6) |  |
| Muslim | 48 | (0.0) | - | (3.4) | (0.6-17.8) | (32.7) | (21.6-46.2) |  |
| Total | 1,610 | 0.3 | (0.1-0.7) | 0.9 | (0.5-1.6) | 17.9 | (15.5-20.5) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |
| Sample sizes might vary slightly due to missing data. |  |  |  |  |  |  |  |  |
| HbAS (Sickle Cell Trait): Hemoglobin S (Carrier for Sickle Cell) |  |  |  |  |  |  |  |  |
| HbE: Hemoglobin E |  |  |  |  |  |  |  |  |
| G6PD: Glucose-6-phosphate Dehydrogenate, which is defined as deficiency when its value is in the range of 0-49 U/dL. |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. For HbAS and HbE stratifications, no significant test were performed because the very low prevalence. |  |  |  |  |  |  |  |  |
| *Some are co-existed with $\alpha$ and $\beta$ Thalassemia |  |  |  |  |  |  |  |  |
| ${ }^{\circ}$ Some are co-existed with $\alpha$ Thalassemia |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Assessed by ELISA |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 | and more | years of | ol. SLC: Scho | Leaving | rtificate. |  |  |  |

Table 9.3: Prevalence of Alpha Thalassemia, Beta Thalassemia and Other Blood Disorders in NonPregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Blood Disorder ${ }^{\text {a }}$ |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\alpha$-Thalassemia* |  | $\beta$-Thalassemia minor ${ }^{\circ}$ |  |  | Other^ than HbAS, HbE, G6PD, $\boldsymbol{\alpha} \& \boldsymbol{\beta}$ Thalassemia |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | p-value | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |  |  |  |
| Eastern | 425 | 1.5 | (0.6-3.6) | 4.4 | (1.9-9.9) |  | 0.0 | - |
| Central | 428 | 0.3 | (0.0-2.1) | 3.1 | (1.9-5.1) |  | 0.7 | (0.2-2.0) |
| Western | 427 | 0.4 | (0.1-2.8) | 3.2 | (1.8-5.5) | 0.171 | 0.6 | (0.2-1.5) |
| Mid-western | 426 | 0.1 | (0.0-0.9) | 1.1 | (0.3-4.0) |  | 0.0 | - |
| Far-western | 430 | 1.2 | (0.6-2.6) | 2.8 | (1.4-5.6) |  | 0.5 | (0.1-2.0) |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 356 | 0.0 | (0.0-0.1) | 1.0 | (0.2-3.9) |  | 0.4 | (0.1-3.0) |
| Hill | 895 | 0.5 | (0.1-1.7) | 1.4 | (0.8-2.4) | <0.001 | 0.8 | (0.4-1.8) |
| Terai | 885 | 0.9 | (0.4-1.8) | 4.9 | (3.2-7.4) |  | 0.0 | - |
| Location |  |  |  |  |  |  |  |  |
| Urban | 294 | 0.0 | - | 2.4 | (0.7-7.7) | 427 | 0.4 | (0.1-2.9) |
| Rural | 1842 | 0.8 | (0.4-1.4) | 3.2 | (2.2-4.7) | . 427 | 0.4 | (0.2-0.9) |
| Age, years |  |  |  |  |  |  |  |  |
| 15-19 | 234 | 0.7 | (0.1-4.9) | 2.9 | (0.6-12.6) |  | 0.1 | (0.0-1.0) |
| 20-29 | 857 | 0.4 | (0.1-1.4) | 4.0 | (2.6-6.2) | 0.174 | 0.1 | (0.0-0.5) |
| 30-39 | 671 | 1.2 | (0.5-3.0) | 2.0 | (1.1-3.6) |  | 0.3 | (0.0-2.3) |
| 40-49 | 374 | 0.0 | (0.0-0.0) | 3.2 | (1.8-5.7) |  | 1.4 | (0.5-3.8) |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |
| Yes | 592 | 0.4 | (0.1-2.1) | 2.2 | (1.3-3.9) | <0.001 | 0.0 | - |
| No | 234 | 0.3 | (0.0-2.0) | 7.6 | (3.5-15.9) | <0.001 | 0.0 | - |
| Education |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 708 | 0.7 | (0.2-2.2) | 3.4 | (2.1-5.6) |  | 0.3 | (0.1-0.5) |
| Primary ${ }^{\text {c }}$ | 360 | 0.2 | (0.0-1.4) | 3.4 | (1.7-6.7) | 0.101 | - | - |
| Some secondary ${ }^{\text {d }}$ | 553 | 0.9 | (0.3-2.9) | 1.5 | (0.7-3.6) |  | 0.7 | (0.2-2.5) |
| SLC and above ${ }^{\mathrm{e}}$ | 515 | 0.6 | (0.2-2.4) | 4.2 | (2.2-7.8) |  | 0.5 | (0.1-2.5) |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 480 | 0.3 | (0.1-1.4) | 1.2 | (0.7-1.9) |  | 0.6 | (0.3-1.2) |
| Second | 447 | 0.0 | (0.0-0.0) | 2.5 | (1.0-6.0) |  | 0.1 | (0.0-1.0) |
| Middle | 416 | 0.7 | (0.2-2.6) | 1.6 | (0.6-3.8) | <0.001 | 0.0 | - |
| Fourth | 398 | 1.3 | (0.5-3.3) | 7.5 | (5.1-10.9) |  | 0.0 | - |
| Highest | 395 | 0.7 | (0.2-2.8) | 2.5 | (1.1-5.5) |  | 1.1 | (0.4-2.9) |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 282 | 0.0 | - | 2.9 | (1.3-6.5) |  | 2.3 | (1.0-5.2) |
| Hill Chhetri | 508 | 0.0 | (0.0-0.0) | 1.1 | (0.4-3.4) |  | 0.0 | - |
| Terai Brahmin/Chhetri | 61 | 0.0 | - | 0.0 | - |  | 0.0 | - |
| Other Terai caste | 128 | 0.0 | - | 5.7 | (2.6-12.2) |  | 0.0 | - |
| Hill Dalit | 264 | 0.2 | (0.0-1.3) | 2.1 | (1.4-3.1) | $<0.001$ | 0.5 | (0.1-2.2) |
| Terai Dalit | 91 | 0.0 | - | 3.7 | (0.7-16.4) |  | 0.0 | - |
| Newar | 73 | 3.9 | (1.0-14.1) | 2.3 | (0.5-10.8) |  | 0.0 | - |
| Hill Janajati | 492 | 0.0 | (0.0-0.0) | 1.5 | (0.5-4.3) |  | 0.1 | (0.0-0.9) |
| Terai Janajati | 198 | 4.6 | (2.2-9.4) | 9.9 | (5.9-16.2) |  | 0.0 | - |
| Muslim | 37 | (0.0) | - | (5.1) | (1.2-19.4) |  | (0.0) | - |
| Total | 2,136 | 0.7 | (0.3-1.2) | 3.1 | (2.2-4.4) |  | 0.4 | (0.2-0.8) |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample sizes might vary slightly due to missing data.
HbAS (Sickle Cell Trait): Hemoglobin S (Carrier for Sickle Cell)
HbE: Hemoglobin E
G6PD: Glucose-6-phosphate Dehydrogenate, which is defined as deficiency when its value is in the range of 0-49 U/dL.
P-value obtained from Pearson's chi-square test. For $\alpha$-Thalassemia and Other^ than HbAS, HbE, G6PD, $\alpha \& \beta$ Thalassemia stratifications, no
significant test were performed because the very low prevalence.
*Some are co-existed with hemoglobin S (HbAS) \& Hemoglobin E (HbE)
${ }^{\circ}$ Few are co-existed with Hb S \& others
$\wedge$ Other blood disorders may be of Hemoglobin D Punjab, Hereditary persistent of fetal hemoglobin, $\alpha$ chain variant possibly Hemoglobin J,
Abnormal hemoglobin unknown and $\beta$ chain variant unknown.
${ }^{\text {a }}$ Assessed by ELISA
${ }^{\text {b }}$ Includes those who have never attended school.
'Includes those who have completed 0-5 years of school.
${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 9.4: Prevalence of Sickle Cell, HbE and G6PD Deficiency in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Blood Disorder ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | HbAS (Sickle Cell)* |  |  | HbE ${ }^{\circ}$ |  |  | G6PD Deficiency |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 425 | 0.0 | - |  | 7.5 | (3.2-16.7) |  | 15.2 | (10.8-20.9) |  |
| Central | 428 | 0.2 | (0.0-1.7) |  | 0.3 | (0.0-2.1) |  | 13.5 | (9.4-19.0) |  |
| Western | 427 | 0.5 | (0.1-2.0) | <0.001 | 0.2 | (0.0-1.8) | $<0.001$ | 15.3 | (12.0-19.4) | 0.115 |
| Mid-western | 426 | 1.3 | (0.5-3.4) |  | 0.0 | - |  | 12.0 | (8.8-16.1) |  |
| Far-western | 430 | 3.4 | (1.8-6.7) |  | 0.1 | (0.0-1.1) |  | 8.2 | (5.4-12.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 356 | 0.0 | - |  | 0.0 | - |  | 5.5 | (3.3-9.0) |  |
| Hill | 895 | 0.3 | (0.1-1.2) | 0.066 | 0.5 | (0.2-1.4) | $<0.001$ | 9.1 | (7.7-10.8) | $<0.001$ |
| Terai | 885 | 1.1 | (0.6-1.9) |  | 3.2 | (1.3-7.8) |  | 18.3 | (14.6-22.8) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 294 | 0.6 | (0.1-4.1) |  | 0.7 | (0.2-2.4) |  | 15.2 | (10.3-21.9) |  |
| Rural | 1,842 | 0.7 | (0.4-1.2) | . 964 | 2.0 | (0.9-4.7) | .105 | 13.3 | (11.0-15.9) | 0.342 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 234 | 1.9 | (0.8-4.4) |  | 1.2 | (0.3-4.8) |  | 19.2 | (13.1-27.4) |  |
| 20-29 | 857 | 0.4 | (0.2-0.9) | 0.088 | 2.7 | (0.9-7.8) | 0.014 | 13.4 | (10.8-16.4) | 031 |
| 30-39 | 671 | 0.8 | (0.3-1.9) | 0.088 | 2.0 | (1.1-3.7) | 0.014 | 13.8 | (10.8-17.3) | . 031 |
| 40-49 | 374 | 0.4 | (0.1-1.4) |  | 0.0 | - |  | 10.4 | (7.3-14.5) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |
| Yes | 592 | 0.6 | (0.2-1.5) | 0.810 | 1.2 | (0.5-2.9) | 0.586 | 14.4 | (11.2-18.2) | 0.314 |
| No | 234 | 0.3 | (0.0-2.0) | 0.810 | 1.0 | (0.2-4.4) | 0.586 | 17.3 | (13.3-22.1) | 0.314 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 708 | 0.6 | (0.3-1.3) |  | 1.1 | (0.5-2.6) |  | 13.7 | (10.6-17.5) |  |
| Primary ${ }^{\text {c }}$ | 360 | 0.6 | (0.2-1.7) | 0.921 | 3.4 | (1.0-10.3) | 0.003 | 15.0 | (10.7-20.6) | 0.145 |
| Some secondary ${ }^{\text {d }}$ | 553 | 0.8 | (0.4-1.8) |  | 3.0 | (1.0-8.9) | 0.003 | 15.2 | (12.0-18.9) | 0.145 |
| SLC and above ${ }^{\text {e }}$ | 515 | 0.6 | (0.2-2.0) |  | 0.6 | (0.2-2.1) |  | 10.9 | (8.5-13.9) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 480 | 0.9 | (0.4-2.4) |  | 0.2 | (0.0-1.5) |  | 10.8 | (8.5-13.8) |  |
| Second | 447 | 0.2 | (0.0-1.3) |  | 1.8 | (0.3-10.3) |  | 13.6 | (10.2-17.8) |  |
| Middle | 416 | 1.0 | (0.4-2.5) | 0.437 | 2.6 | (0.8-8.7) | 0.201 | 14.6 | (11.0-19.0) | 0.566 |
| Fourth | 398 | 1.0 | (0.4-2.4) |  | 2.0 | (1.2-3.5) |  | 14.9 | (10.6-20.7) |  |
| Highest | 395 | 0.3 | (0.0-2.4) |  | 2.1 | (1.0-4.6) |  | 13.3 | (9.7-17.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 282 | 0.6 | (0.1-4.2) |  | 0.6 | (0.1-4.1) |  | 11.0 | (7.5-15.9) |  |
| Hill Chhetri | 508 | 0.2 | (0.0-1.4) |  | 0.1 | (0.0-0.6) |  | 8.6 | (6.5-11.4) |  |
| Terai Brahmin/Chhetri | 61 | 0.0 | - |  | 0.0 | - |  | 21.1 | (13.6-31.2) |  |
| Other Terai Caste | 128 | 0.0 | - |  | 0.8 | (0.1-5.9) |  | 23.6 | (12.4-40.2) |  |
| Hill Dalit | 264 | 0.0 | - |  | 0.0 | - |  | 11.7 | (7.8-17.0) |  |
| Terai Dalit | 91 | 0.0 | - | <0.001 | 0.7 | (0.1-5.6) | <0.001 | 16.5 | (7.6-32.2) | <0.001 |
| Newar | 73 | 0.0 | - |  | 0.0 | - |  | 6.9 | (3.2-14.2) |  |
| Hill Janajati | 492 | 0.2 | (0.0-1.1) |  | 0.9 | (0.3-2.9) |  | 14.4 | (11.9-17.4) |  |
| Terai Janajati | 198 | 5.4 | (3.0-9.5) |  | 14.6 | (5.8-32.2) |  | 13.8 | (9.6-19.5) |  |
| Muslim | 37 | (0.0) | - |  | (0.0) | - |  | (16.7) | (6.7-35.9) |  |
| Total | 2,136 | 0.7 | (0.4-1.1) |  | 1.9 | (0.8-4.1) |  | 13.5 | (11.5-15.9) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample sizes might vary slightly due to missing data.
HbAS (Sickle Cell Trait): Hemoglobin S (Carrier for Sickle Cell)
HbE: Hemoglobin E
G6PD: Glucose-6-phosphate Dehydrogenate, which is defined as deficiency when its value is in the range of 0-49 U/dL.
P-value obtained from Pearson's chi-square test.
*Some are co-existed with $\alpha$ and $\beta$ Thalassemia
${ }^{\circ}$ Some are co-existed with $\alpha$ Thalassemia
${ }^{\text {a }}$ Assessed by ELISA
${ }^{\text {b }}$ Includes those who have never attended school.
'Includes those who have completed 0-5 years of school.
${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

# Anthropometry Status 

The survey collected data on nutritional status of children 6-59 months, adolescent boys and girls 10-19 years and non-pregnant women 15-49 years. The survey collected data on recumbent length (for children under 2 years) or height (for children above 2 years, adolescent boys and girls 10-19 years, and non-pregnant women 15-49 years) and weight. Indicators of the nutritional status for children 6-59 months: weight-for-age z-score (WAZ), length/height-forage z -score (LAZ/HAZ), and weight-for-length/height z -score (WLZ/WHZ) were calculated using growth standards published by the World Health Organization (WHO, 2006). Nutritional status of adolescent 10-19 years was assessed using BMI-for-age z-score (BMIZ) using growth standards published by the World Health Organization (WHO, 2007). Nutritional status of nonpregnant women 15-49 years was assessed by BMI. BMI is expressed as the ratio of weight in kilograms to the square of height in meters $\left(\mathrm{kg} / \mathrm{m}^{2}\right)$. There were no missing anthropometry data for those who agreed to participate in the survey. Annex Tables 10.1-10.3 presents data reflecting the quality of the anthropometry measurements including biologically implausible values and digit preference.

### 10.1 Prevalence of Stunting among Children 6-59 Months

Table 10.1 shows the prevalence of stunting (LAZ/HAZ <-2z) and severe stunting (LAZ/HAZ<-3z) among 1,701 children 6-59 months. Nationally, 35 percent of children aged 6-59 months suffered from stunting, while 15 percent from severe stunting. Prevalence of stunting varied by all characteristics and was higher among children in Mid-western development region ( 52 percent) and Mountain ecological region ( 45 percent). Compared to urban areas, stunting was higher in rural areas ( 28 percent in urban versus 36 percent in rural). Analysis by age group shows that stunting is highest in children $36-47$ months ( 41 percent) and lowest in 6-11 months (18 percent) (Figure 10.1). Slightly higher percent of males were stunted than females ( 38 percent versus 32 percent). Data also shows that almost half ( 47 percent) of children with mother who had no education suffered from stunting. The percentage of stunting in children decreases with increases in wealth quintile: 50 percent in the lowest compared to 20 percent in the highest wealth quintile. Results of stunting indicate that slightly more male
children are suffering compared to their female counterparts (Table 10.1). Severe stunting among children 6-59 months also varied by development region, ecological region, age of children, maternal education, wealth quintile, and ethnicity. Severe stunting ranged from 10 percent in the Western region to 23 percent in the Mid-western region and from 12 percent in the Hill to 19 percent in the Mountain. The prevalence of severe stunting ranged from seven percent among children 6-11 months of age to 20 percent among those 36-47 months. Around one in five children suffered from severe stunting among those whose mothers have no education (20 percent) and or if the children were from lowest wealth quintile (22 percent).

### 10.2 Prevalence of Underweight among Children 6-59 Months

Table 10.2 shows the prevalence of underweight (WAZ<-2z) and severe underweight (WAZ<$3 z$ ) among 1,701 children aged 6-59 months. Nationally, 29 percent of children suffered from underweight, and eight percent from severe underweight. Prevalence of underweight varied by most characteristics and was highest among children in the Mid-western developmental region (38 percent) and in the Mountain ecological region (35 percent). Compared to urban areas, underweight was higher in rural areas ( 19 percent versus 31 percent). Analysis by age group shows that underweight significantly increases with increasing age of the children (17 percent among children 6-11 months and 35 percent among 48-59 months) (Figure 10.1). Data shows that almost two-fifths ( 39 percent) of children with mothers who had no education or from the lowest wealth quintile group (41 percent) suffered from underweight.

Severe underweight among children 6-59 months ranged from six percent in the Western region to 15 percent in the Mid-western region. Severe underweight significantly varied with the level of maternal education (12 percent among no maternal education group versus four percent among some secondary education) and wealth quintile (14 percent among lowest quintile versus two percent among highest quintile).

### 10.3 Prevalence of Wasting, Overweight and Obesity among Children 6-59 Months

Table 10.3 shows the prevalence of wasting (weight-for-length/height z-zcore (WLZ/WHZ) <$2 z$ ), severe wasting (WLZ/WHZ<-3z), overweight (WLZ/WHZ>2z), and obesity (WLZ/WHZ>3z) among 1,701 children aged 6-59 months. Overall, 11 percent of children 659 months suffered from wasting, and two percent suffered from severe wasting. Around one percent ( 0.9 percent) and less than one percent ( 0.3 percent) of children 6-59 months suffered from overweight and obesity, respectively. Prevalence of wasting was higher among children in the Terai (13 percent) than compared with the Hill and Mountain regions (nine percent each). Children in rural areas were more likely to suffer from wasting than their counterparts in urban area ( 12 percent versus five percent). The prevalence of wasting was higher among children in the lowest wealth quintile group (15 percent) and middle quintile group ( 14 percent) than compared with the other groups.

Severe wasting was higher among children in rural areas (three percent) versus urban areas (one percent) and among the lowest wealth quintile group (five percent) versus highest quintile group
(less than one percent). Overweight and obesity did not vary among children by background characteristics.

Figure 10.1: Prevalence of Stunting, Wasting and Underweight in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016


### 10.4 Prevalence of Stunting among Adolescent Boys 10-19 Years

Table 10.4 shows the prevalence of stunting (HAZ <-2z) and severe stunting (HAZ <-3z) among 981 adolescent boys $10-19$ years. Overall, almost one-third ( 32 percent) of the boys suffered from stunting, and one in ten (11 percent) suffered from severe stunting. Stunting prevalence varied by most characteristics and ranged from 26 percent in the Eastern region to 42 percent in the Mid-western region and from 28 percent in the Terai to 45 percent in the Mountain region. Younger adolescent boys were more likely to suffer from stunting than their older counterparts ( 36 percent among 10-14 years and 26 percent among 15-19 years). The adolescent boys who were from the lowest wealth quintile had a higher prevalence of stunting than compared with the highest wealth quintile ( 51 percent versus 20 percent).

Severe stunting was higher among adolescent boys in the younger age group (13 percent) compared to the older age group (six percent) and ranged from around 20 percent among the lowest wealth quintile to three percent among the highest quintile group.

### 10.5 Prevalence of Wasting, Overweight and Obesity among Adolescent Boys 10-19 Years

Nutritional status of adolescent boys 10-19 years was assessed using body-mass-index z-score (BMIZ). Wasting (BMIZ $<-2 z$ ), severe wasting (BMIZ $<-3 z$ ), overweight (BMIZ $>1 z$ ), and obesity ( $\mathrm{BMIZ}>2 \mathrm{z}$ ) among 982 adolescent boys aged 10-19 years are presented in Table 10.5. Overall, 23 percent of boys suffered from wasting, and five percent suffered from severe
wasting. A total of five percent boys suffered from overweight and one percent from obesity. Prevalence of wasting was highest among boys in the Far-western region (27 percent) and lowest in the Eastern region (16 percent). Adolescent boys in the Terai region were more likely to suffer from wasting ( 28 percent) than compared with their counterparts in the Mountain (22\%) and the Hill (18 percent). The prevalence of wasting was higher among boys in the younger age group than older age group ( 28 percent among 10-14 years versus 17 percent among 15-19 years). It was also higher among boys with a lower level of education than a higher level of education ( 33 percent among those in the primary education group versus 20 percent and 13 percent among those with some secondary and SLC and above level of education group respectively).

Severe wasting was significantly associated with age and education level of adolescent boys. For example, three percent of boys among the 15-19 years age group had severe wasting compared to seven percent among the 10-14 years age group. Two percent of adolescent boys with an education level of SLC or higher had severe wasting while nine percent did so among the boys in the primary education group.

Overweight varied by development region, location and wealth quintile. In Far-western region, overweight among boys was less than one percent while it was eight percent in Central region. Ten percent of boys in urban areas suffered from overweight compared to four percent in rural areas.

### 10.6 Prevalence of Stunting among Non-Pregnant Adolescent Girls 10-19 Years

Table 10.6 shows the prevalence of stunting (HAZ<-2z) and severe stunting (HAZ<-3z) among 1722 non-pregnant adolescent girls aged 10-19 years. Overall, almost one-third (32 percent) of the girls suffered from stunting, and eight percent suffered from severe stunting. Stunting was highest among adolescent girls 10-19 years in the Mid-western region (41 percent) and lowest in the Eastern region (28 percent). Adolescent girls in rural areas were more likely to suffer from stunting than their counterparts in urban areas ( 34 percent versus 20 percent). Likewise, adolescent girls in the younger age group were more likely to suffer from stunting than their older counterparts ( 34 percent among 10-14 years and 29 percent among 15-19 years). Household wealth quintile as well as level of education were significantly associated with prevalence of stunting where girls from the lowest wealth quintile had a 49 percent prevalence girls in the highest wealth quintile had a prevalence of 16 percent. Adolescent girls with no education or a primary level of education had a 38 percent and 45 percent prevalence of stunting whereas girls with an education of SLC or higher had a prevalence of 17 percent.

Severe stunting ranged from 12 percent in the Far-western region to six percent each in the Central and Western region. Adolescent girls from the younger age group suffered more from severe stunting than girls in the older age group (11 percent among 10-14 years and four percent among 15-19 years). Severe stunting decreased with increasing education level and wealth quintile ranging from 18 percent among the no education group to one percent among SLC and above level of education and from 16 percent in the lowest wealth quintile group to three percent among the highest wealth group.

### 10.7 Prevalence of Wasting, Overweight and Obesity among Non-Pregnant Adolescent Girls 10-19 Years

Nutritional status of non-pregnant adolescent girls 10-19 years was assessed using BMIZ. Table 10.7 presents wasting (BMIZ<-2z), severe wasting (BMIZ<-3z), overweight ( $\mathrm{BMIZ}>1 \mathrm{z}$ ), and obesity ( $\mathrm{BMIZ}>2 \mathrm{z}$ ) among 1,722 adolescent girls. Overall, 14 percent of adolescent girls suffered from wasting and three percent from severe wasting. The prevalence of wasting was higher among girls in the younger age group than the older age group (18 percent among 10-14 years versus eight percent among 15-19 years). Wasting among adolescent girls varied by wealth and education level. Girls in the lowest wealth quintile had 19 percent prevalence of wasting and eight percent had wasting among their counterparts in the highest wealth quintile. Wasting ranged from 22 percent among girls with a primary level of education to seven percent among those with an SLC and above level education. The prevalence of severe wasting ranged from four percent in the Terai to two percent in the Hill and one percent in the Mountain regions. Severe wasting was higher among girls in younger age group (five percent) than older age group (one percent). Severe wasting also varied by education level of adolescent girls ranging from five percent in no education or primary level education groups to two percent in some secondary and SLC and above level education groups.

Overall, four percent of adolescent girls had overweight and less than one percent ( 0.7 percent) had obesity. Overweight ranged from eight percent in the Eastern region to two percent in the Far-western region. Adolescent girls in urban areas had more overweight than girls in rural areas (10 percent vs four four percent). Overweight among adolescent girls was 12 percent among those in the highest wealth quintile group and four percent or less in the other wealth groups. Obesity among adolescent girls ranged from two percent in Eastern region to one percent in Central region and less than one percent in other regions. Further, obesity was four percent among girls in highest wealth quintile while it was below one percent in other wealth quintile groups.

### 10.8 Mean Height, Weight and Prevalence of Stunting among Non-Pregnant Women 15-49 Years

The nutritional status of women 15-49 years was assessed with two anthropometric indices: height and body mass index. Table 10.8 shows the mean height and weight of 2139 nonpregnant women aged 15-49 years and the prevalence of stunting (height<145 cm) among them. Short stature in women is a risk factor for poor birth outcomes and obstetric complications. A woman is considered at risk for these adverse outcomes if her height is below 145 cm . The mean height of the non-pregnant women 15-49 years was 151.4 cm and the mean weight was 51.3 kg . A total of 11 percent of women 15-49 years were shorter than 145 cm . Women in the Eastern region (16 percent) were more likely to be shorter while women in the Far-western region (six percent) were least likely. Higher proportion of women 15-49 years from the Mountain and the Terai (13 percent each) regions were shorter than women from the Hill (eight percent) region. The likelihood of being short decreases with increasing level of education where higher proportions of women with no education and primary education women were short (14 percent each) than women who have SLC and above level of education (seven percent). Household wealth quintile was associated with short stature of women where
the prevalence was 15 percent among women in the lowest wealth quintile compared to eight percent among those in the highest quintile.

### 10.9 Prevalence of Thinness/Underweight, Overweight and Obesity among Non-Pregnant Women 15-49 Years

Table 10.9 shows the mean BMI and prevalence of thinness, normal weight, overweight or obesity among non-pregnant women 15-49 years. The mean BMI was $22.4 \mathrm{~kg} / \mathrm{m}^{2}$. Overall, 15 percent of women suffer from thinness or underweight (BMI $<18.5 \mathrm{~kg} / \mathrm{m}^{2}$ ), 19 percent from overweight (BMI between $25.0-29.9 \mathrm{~kg} / \mathrm{m}^{2}$ ) and five percent from obesity (BMI>30.0 $\mathrm{kg} / \mathrm{m}^{2}$ ). Prevalence of thinness or underweight among non-pregnant women varied by development region, ecological region, age and wealth quintile. Prevalence of thinness was highest among women in the Far-western region ( 24 percent) and lowest in the Eastern and Central regions (13 percent each). Women living in the Hill region were less likely to be thin compared to women in the Mountain and Terai (12 percent in Hill versus 16 percent in Mountain and Terai) region. Thinness was more common among women in the younger age group than older age counterparts ( 33 percent among 15-19 years versus 13 percent among 40-49 years and 10 percent among $30-39$ years). Women in the lowest wealth quintile ( 20 percent) were more likely to be thin/underweight than women in the highest wealth quintile (seven percent).

Overweight was more prevalent among women 15-49 years in the Western (22 percent) and Central region (21 percent) than the other three regions. A higher proportion of women in urban areas suffer from overweight than in rural areas ( 25 percent versus 17 percent). Overweight was more common among older age groups (almost 25 percent among age 30 and above) than younger age groups (four percent among 15-19 years) and among the highest wealth quintile group ( 30 percent) than the lowest wealth quintile group ( 10 percent).

Obesity was also eight percent among women in the Central region and seven percent among those living in Hill areas. Obesity was also significantly associated with age and wealth quintile of the households. For example, 10 percent of the women in age group 40-49 suffered from obesity while none of the women in 15-19 years age group did so and nine percent of the women in the highest wealth quintile suffered from obesity while less than one percent suffered from obesity in the lowest wealth quintile.

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For more information on the anthropometry status, see the following tables:

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Table 10.8: Mean Height and Weight, and Prevalence of Stunting in Non-Pregnant Women 15-49 Years in Nepal
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Table 10.1: Mean length/height-for-age z-score (LAZ/HAZ) and the Prevalence of Stunting in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean z-score(95\% CI) |  |  | Stunting |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | $\begin{aligned} & \hline \text { <-2 z-score } \\ & \text { (Stunted) } \end{aligned}$ |  |  | $\begin{gathered} <-3 \text { z-score } \\ \text { (Severely stunted) } \end{gathered}$ |  |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \hline \text { (95\% CI) } \\ \text { z-score } \\ \hline \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | -1.45 | 1.32 | (-1.70,-1.20) | 32.5 | (23.5-43.0) |  | 11.4 | (6.1-20.3) |  |
| Central | 353 | -1.52 | 1.50 | (-1.66,-1.38) | 32.1 | (27.1-37.5) |  | 14.9 | (11.1-19.8) |  |
| Western | 290 | -1.44 | 1.21 | (-1.60,-1.27) | 26.2 | (20.9-32.4) | $<0.001$ | 10.1 | (6.6-15.2) | $<0.001$ |
| Mid-western | 350 | -1.92 | 1.47 | (-2.16,-1.69) | 52.0 | (45.1-58.8) |  | 22.5 | (18.1-27.7) |  |
| Far-western | 376 | -1.87 | 1.30 | (-2.03,-1.71) | 42.4 | (37.1-47.8) |  | 18.5 | (14.1-24.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 273 | -1.91 | 1.38 | (-2.11,-1.72) | 45.3 | (39.1-51.7) |  | 18.7 | (13.7-25.1) |  |
| Hill | 706 | -1.53 | 1.32 | (-1.62,-1.44) | 32.7 | (29.7-35.9) | 0.019 | 12.3 | (10.4-14.4) | 0.043 |
| Terai | 722 | -1.57 | 1.46 | (-1.73,-1.42) | 35.4 | (29.8-41.4) |  | 16.2 | (12.2-21.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 226 | -1.34 | 1.47 | (-1.71,-0.96) |  | (18.3-40.6) | 0.022 | 11.1 | (3.6-29.4) | 0.087 |
| Rural | 1,475 | -1.62 | 1.39 | (-1.71,-1.52) | 36.0 | (32.5-39.7) | 0.022 | 15.3 | (13.0-17.9) | 0.087 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-11 | 159 | -0.87 | 1.23 | (-1.08,-0.66) | 17.8 | (11.3-26.9) |  | 6.6 | (3.3-12.7) |  |
| 12-23 | 347 | -1.29 | 1.43 | (-1.44,-1.14) | 29.5 | (25.9-33.2) |  | 9.5 | (7.1-12.6) |  |
| 24-35 | 391 | -1.69 | 1.33 | (-1.85,-1.53) | 37.0 | (31.6-42.7) | $<0.001$ | 17.4 | (13.0-22.7) | $<0.001$ |
| 36-47 | 416 | -1.87 | 1.44 | (-2.01,-1.72) | 41.2 | (35.7-46.9) |  | 19.6 | (15.8-24.1) |  |
| 48-59 | 388 | -1.72 | 1.32 | (-1.86,-1.58) | 38.5 | (33.1-44.2) |  | 15.3 | (11.4-20.1) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 855 | -1.68 | 1.40 | (-1.78,-1.57) | 37.6 | (34.0-41.4) | 015 | 16.2 | (13.6-19.3) | 066 |
| Female | 846 | -1.47 | 1.39 | (-1.59,-1.36) | 32.0 | (28.1-36.2) | , 015 | 13.1 | (10.3-16.4) | 0.066 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | -1.89 | 1.51 | (-2.14,-1.65) | 46.7 | (38.3-55.2) |  | 20.0 | (12.6-30.4) |  |
| Primary ${ }^{\text {b }}$ | 175 | -1.70 | 1.21 | (-1.91,-1.49) | 34.9 | (28.4-42.0) | <0.001 | 12.0 | (8.6-16.6) | 0.023 |
| Some secondary ${ }^{\text {c }}$ | 241 | -1.42 | 1.30 | (-1.57,-1.27) |  | (23.6-34.6) | <0.001 | 10.3 | (8.1-13.1) | 0.023 |
| SLC and above ${ }^{\text {d }}$ | 230 | -1.38 | 1.37 | (-1.58,-1.18) | 25.0 | (20.2-30.6) |  | 13.1 | (9.1-18.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 472 | -2.05 | 1.42 | (-2.18,-1.92) | 49.6 | (44.8-54.4) |  | 21.8 | (18.3-25.7) |  |
| Second | 351 | -1.75 | 1.35 | (-1.93,-1.57) | 40.8 | (35.0-46.9) |  | 17.7 | (11.9-25.7) |  |
| Middle | 301 | -1.56 | 1.35 | (-1.73,-1.39) | 35.2 | (28.6-42.3) | $<0.001$ | 16.2 | (12.1-21.3) | <0.001 |
| Fourth | 317 | -1.33 | 1.37 | (-1.53,-1.14) | 28.1 | (23.2-33.7) |  | 9.4 | (6.5-13.4) |  |
| Highest | 260 | -1.17 | 1.33 | (-1.37,-0.96) | 19.8 | (13.0-29.0) |  | 8.1 | (3.6-17.0) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | -1.13 | 1.28 | (-1.35,-0.91) |  | (11.7-24.4) |  | 7.1 | (4.4-11.3) |  |
| Hill Chhetri | 400 | -1.66 | 1.31 | (-1.84,-1.49) | 37.6 | (31.0-44.7) |  | 13.6 | (9.8-18.6) |  |
| Terai Brahmin/Chhetri | 42 | (-1.45) | (1.79) | (-1.83,-1.06) | (41.4) | (31.7-51.8) |  | (7.9) | (1.5-31.9) |  |
| Other Terai Caste | 135 | -1.83 | 1.62 | (-2.11,-1.55) | 46.7 | (38.7-54.9) |  | 22.7 | (16.2-30.9) |  |
| Hill Dalit | 270 | -1.79 | 1.26 | (-1.97,-1.61) | 40.4 | (33.1-48.2) | <0.001 | 16.4 | (11.5-22.9) | <0.001 |
| Terai Dalit | 89 | -1.88 | 1.32 | (-2.28,-1.49) | 43.5 | (30.2-57.8) | <0.001 | 23.0 | (14.4-35.3) |  |
| Newar | 51 | -0.89 | 1.03 | (-1.14,-0.64) | 11.5 | (5.1-24.2) |  | 0.0 | - |  |
| Hill Janajati | 385 | -1.49 | 1.31 | (-1.61,-1.37) | 30.4 | (26.5-34.5) |  | 11.4 | (8.6-14.9) |  |
| Terai Janajati | 119 | -1.32 | 1.52 | (-1.71,-0.93) | 30.7 | (20.8-42.8) |  | 17.0 | (9.4-28.9) |  |
| Muslim | 50 | -1.98 | 1.46 | (-2.58,-1.38) | 46.9 | (28.5-66.1) |  | 25.4 | (11.8-46.2) |  |
| Total | 1,701 | -1.58 | 1.40 | (-1.67,-1.49) | 35.0 | (31.8-38.4) |  | 14.8 | (12.5-17.4) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |
| CI-Confidence Interval. |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {C I Includes those who have completed 6-9 years of school. }}$ |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |

Table 10.2: Mean weight-for-age z-score (WAZ) and the Prevalence of Underweight in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\begin{aligned} & \text { Mean z-score } \\ & \text { (95\% CI) } \end{aligned}$ |  |  | Underweight |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score (Underweight) |  |  | <-3 z-score (Severely underweight) |  |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\underset{\text { z-score }}{\text { SD }}$ | $\begin{gathered} \hline \text { (95\% CI) } \\ \text { z-score } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | -1.35 | 1.23 | (-1.60,-1.11) | 30.3 | (21.8-40.3) |  | 9.2 | (5.0-16.4) |  |
| Central | 353 | -1.29 | 1.24 | (-1.44,-1.14) | 25.6 | (20.5-31.4) |  | 6.5 | (4.7-8.8) |  |
| Western | 290 | -1.33 | 1.09 | (-1.48,-1.18) | 23.5 | (18.4-29.5) | <0.001 | 5.8 | (2.5-12.8) | <0.001 |
| Mid-western | 350 | -1.71 | 1.15 | (-1.89,-1.54) | 37.7 | (31.8-44.0) |  | 15.2 | (11.1-20.6) |  |
| Far-western | 376 | -1.65 | 1.06 | (-1.75,-1.54) | 35.6 | (31.3-40.1) |  | 8.0 | (5.8-10.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 273 | -1.58 | 1.08 | (-1.68,-1.48) | 35.0 | (30.3-39.9) |  | 9.0 | (6.5-12.2) |  |
| Hill | 706 | -1.26 | 1.15 | (-1.37,-1.16) | 23.6 | (20.8-26.7) | <0.001 | 6.7 | (5.0-9.0) | 0.121 |
| Terai | 722 | -1.50 | 1.23 | (-1.64,-1.36) | 32.5 | (27.2-38.1) |  | 9.6 | (6.8-13.4) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 226 | -0.98 | 1.26 | (-1.17,-0.79) | 18.9 | (11.4-29.8) | 0.001 | 4.9 | (2.8-8.5) | 0.053 |
| Rural | 1,475 | -1.47 | 1.17 | (-1.56,-1.38) | 30.5 | (27.0-34.2) |  | 8.9 | (7.0-11.2) | 0.053 |
| Age, months |  |  |  |  |  |  |  |  |  |  |
| 6-11 | 159 | -0.93 | 1.31 | (-1.17,-0.70) | 17.3 | (10.7-26.7) |  | 5.8 | (3.0-10.9) |  |
| 12-23 | 347 | -1.25 | 1.18 | (-1.39,-1.10) | 24.0 | (19.7-28.8) |  | 7.1 | (5.2-9.6) |  |
| 24-35 | 391 | -1.48 | 1.13 | (-1.61,-1.34) | 29.0 | (23.3-35.5) | $<0.001$ | 8.2 | (5.3-12.4) | 0.481 |
| 36-47 | 416 | -1.44 | 1.24 | (-1.58,-1.30) | 31.6 | (27.1-36.4) |  | 9.0 | (6.7-11.9) |  |
| 48-59 | 388 | -1.63 | 1.09 | (-1.79,-1.48) | 35.4 | (29.0-42.4) |  | 10.1 | (6.6-15.2) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |
| Male | 855 | -1.45 | 1.18 | (-1.56,-1.34) | 30.8 | (27.1-34.7) | 082 | 8.6 | (6.4-11.4) | 717 |
| Female | 846 | -1.36 | 1.20 | (-1.46,-1.26) | 26.9 | (23.0-31.2) | . 082 | 8.1 | (6.3-10.4) | 717 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | -1.69 | 1.23 | (-1.86,-1.52) | 39.0 | (31.9-46.7) |  | 11.6 | (7.0-18.6) |  |
| Primary ${ }^{\text {b }}$ | 175 | -1.56 | 1.07 | (-1.76,-1.35) | 28.9 | (21.8-37.2) | <0.001 | 10.5 | (6.3-17.2) | 0.024 |
| Some secondary ${ }^{\text {c }}$ | 241 | -1.25 | 1.05 | (-1.40,-1.09) | 20.6 | (15.0-27.6) | <0.001 | 4.3 | (2.4-7.7) | 0.024 |
| SLC and above ${ }^{\text {d }}$ | 230 | -1.20 | 1.20 | (-1.40,-1.00) | 22.5 | (17.6-28.4) |  | 7.7 | (4.9-11.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 472 | -1.71 | 1.26 | (-1.83,-1.60) | 40.5 | (36.5-44.7) |  | 13.5 | (10.6-17.1) |  |
| Second | 351 | -1.50 | 1.11 | (-1.67,-1.33) | 29.1 | (22.9-36.3) |  | 9.2 | (5.3-15.6) |  |
| Middle | 301 | -1.52 | 1.10 | (-1.69,-1.34) | 31.9 | (25.2-39.4) | <0.001 | 7.7 | (4.8-12.1) | <0.001 |
| Fourth | 317 | -1.30 | 1.20 | (-1.49,-1.12) | 25.2 | (20.6-30.5) |  | 8.3 | (5.7-12.0) |  |
| Highest | 260 | -0.96 | 1.14 | (-1.13,-0.80) | 16.8 | (12.3-22.6) |  | 2.4 | (0.9-6.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 158 | -1.10 | 1.08 | (-1.31,-0.89) | 14.5 | (10.0-20.5) |  | 5.5 | (3.1-9.6) |  |
| Hill Chhetri | 400 | -1.42 | 1.17 | (-1.59,-1.26) | 31.4 | (25.8-37.6) |  | 8.6 | (5.1-14.1) |  |
| Terai Brahmin/Chhetri | 42 | (-1.26) | (1.74) | (-2.36,-0.16) | (36.0) | (22.8-51.7) |  | (11.7) | (5.3-24.1) |  |
| Other Terai Caste | 135 | -1.77 | 1.22 | (-1.97,-1.56) | 41.7 | (45.4-48.2) |  | 11.6 | (6.4-20.2) |  |
| Hill Dalit | 270 | -1.54 | 1.04 | (-1.71,-1.38) | 33.7 | (27.3-40.8) | <0.001 | 7.6 | (4.9-11.5) | <0.001 |
| Terai Dalit | 89 | -1.84 | 1.08 | (-2.12,-1.56) | 43.8 | (31.4-57.0) | -0.01 | 14.1 | (6.6-27.7) | <0.001 |
| Newar | 51 | -0.72 | 0.96 | (-1.00,-0.44) | 6.2 | (2.2-16.3) |  | 0.0 | - |  |
| Hill Janajati | 385 | -1.15 | 1.13 | (-1.25,-1.05) | 18.8 | (15.6-22.4) |  | 4.7 | (3.3-6.7) |  |
| Terai Janajati | 119 | -1.39 | 1.19 | (-1.70,-1.08) | 28.3 | (18.1-41.4) |  | 9.8 | (5.5-17.0) |  |
| Muslim | 50 | -1.88 | 1.30 | (-2.38,-1.37) | 45.0 | (27.9-63.3) |  | 19.1 | (7.7-40.0) |  |
| Total | 1,701 | -1.41 | 1.19 | (-1.49, -1.32) | 29.0 | (25.9-32.2) |  | 8.4 | (6.7-10.4) |  |

[^30]| Characteristics | N | $\begin{gathered} \text { Mean z-score } \\ (95 \% \mathrm{CI}) \\ \hline \end{gathered}$ |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score (Wasted) |  |  | $<-3 \mathrm{z}$-score (Severely wasted) |  |  | >-2 z-score (Overweight) |  | >-3 z-score (Obese) |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \hline \text { SD } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \hline \mathbf{( 9 5 \% ~ C I )} \\ \text { z-score } \end{gathered}$ | \% | (95\% CI) | p -value | \% | (95\% CI) | p-value | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | -0.78 | 1.13 | (-0.96,-0.61) | 14.8 | (10.7-20.2) |  | 1.7 | (0.7-4.2) |  | 0.7 | (0.2-2.7) | 0.4 | (0.1-3.2) |
| Central | 353 | -0.68 | 1.13 | (-0.81,-0.55) | 9.4 | (6.0-14.4) |  | 1.9 | (1.2-3.1) |  | 1.5 | (0.6-3.8) | 0.3 | (0.3-0.4) |
| Western | 290 | -0.75 | 0.98 | (-0.91,-0.59) | 9.8 | (5.9-15.8) | 0.058 | 2.7 | (1.3-5.6) | 0.309 | 0.2 | (0.0-0.9) | 0.0 | (0.0-0.1) |
| Mid-western | 350 | -0.74 | 1.20 | (-0.86,-0.62) | 13.1 | (10.1-16.9) |  | 4.1 | (2.5-6.8) |  | 1.1 | (0.4-2.8) | 0.7 | (0.2-2.2) |
| Far-western | 376 | -0.83 | 1.02 | (-0.94,-0.72) | 10.1 | (6.8-14.8) |  | 2.4 | (1.5-3.9) |  | 0.4 | (0.1-1.6) | 0.2 | (0.0-1.5) |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 273 | -0.66 | 1.06 | (-0.79,-0.54) | 8.6 | (6.1-11.9) |  | 2.2 | (0.9-5.3) |  | 1.0 | (0.4-2.7) | 0.3 | (0.2-0.3) |
| Hill | 706 | -0.59 | 1.13 | (-0.69,-0.49) | 9.4 | (7.5-11.7) | 0.031 | 2.1 | (1.6-2.7) | 0.779 | 1.4 | (0.6-3.3) | 0.4 | (0.3-0.7) |
| Terai | 722 | -0.87 | 1.08 | (-0.97,-0.77) | 13.2 | (10.0-17.2) |  | 2.6 | (1.6-4.2) |  | 0.5 | (0.2-1.4) | 0.3 | (0.1-1.2) |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 226 | -0.49 | 1.01 | (-0.62,-0.36) |  | (2.4-10.6) |  | 0.6 | (0.1-3.0) |  | 0.8 | (0.2-3.0) | 0.0 | - |
| Rural | 1,475 | -0.77 | 1.12 | (-0.85,-0.69) |  | (10.0-14.7) | 0.002 | 2.6 | (2.0-3.5) | 0.046 | 1.0 | (0.5-1.9) | 0.4 | (0.2-0.8) |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 | 159 | -0.51 | 1.21 | (-0.71,-0.31) |  | (6.6-16.5) |  | 2.7 | (1.0-6.8) |  | 1.4 | (0.2-9.5) | 0.0 | - |
| 12-23 | 347 | -0.88 | 1.09 | (-1.02,-0.73) | 14.7 | (11.1-19.2) |  | 3.2 | (1.8-5.6) |  | 0.8 | (0.2-3.5) | 0.1 | (0.0-0.7) |
| 24-35 | 391 | -0.74 | 1.10 | (-0.85,-0.64) | 11.4 | (7.9-16.1) | 0.075 | 2.9 | (1.5-5.8) | 0.503 | 0.6 | (0.1-2.3) | 0.0 | - |
| 36-47 | 416 | -0.58 | 1.13 | (-0.68,-0.49) |  | (6.0-10.9) |  | 1.9 | (1.6-2.4) |  | 1.6 | (1.1-2.3) | 0.9 | (0.5-1.5) |
| 48-59 | 388 | -0.86 | 1.03 | (-0.99,-0.72) | 11.5 | (7.6-16.9) |  | 1.4 | (0.6-3.1) |  | 0.5 | (0.1-2.6) | 0.4 | (0.1-2.9) |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 855 | -0.76 | 1.09 | (-0.85,-0.67) | 11.8 | (9.4-14.6) |  | 2.0 |  |  | 1.0 | (0.4-2.6) | 0.4 | (0.2-0.6) |
| Female | 846 | -0.71 | 1.13 | (-0.79,-0.63) | 10.7 | (8.3-13.6) | 0.459 | $2.8$ | (1.9-4.1) | 0.275 | 0.9 | (0.4-1.7) | 0.3 | (0.1-1.3) |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | -0.93 | 0.97 | (-1.05,-0.80) |  | (6.6-11.9) |  | 2.7 | (1.5-5.0) |  | 0.3 | (0.0-2.1) | 0.3 | (0.0-2.2) |
| Primary ${ }^{\text {b }}$ | 175 | -0.73 | 1.18 | (-0.91,-0.56) | 14.0 | (8.7-21.8) | 0.182 | 4.0 | (1.7-9.4) | 0.116 | 1.5 | (1.0-2.1) | 0.2 | (0.0-1.5) |
| Some secondary ${ }^{\text {c }}$ | 241 | -0.63 | 1.03 | (-0.78,-0.47) | 9.0 | (5.4-14.7) | 0.182 | 2.0 | (1.1-3.9) | 0.116 | 0.3 | (0.1-1.0) | 0.2 | (0.1-0.2) |
| SLC and above ${ }^{\text {d }}$ | 230 | -0.72 | 1.00 | (-0.88,-0.57) | 8.1 | (4.5-14.0) |  | 0.6 | (0.1-3.9) |  | 0.9 | (0.1-6.1) | 0.0 | - |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 472 | -0.77 | 1.27 | (-0.87,-0.67) | 14.5 | (11.9-17.6) |  | 4.5 | (2.9-6.9) |  | 1.8 | (1.2-2.7) | 1.0 | (0.6-1.8) |
| Second | 351 | -0.72 | 1.06 | (-0.84,-0.59) | 9.0 | (6.0-13.1) |  | 2.8 | (1.5-5.1) |  | 0.3 | (0.0-2.1) | 0.0 | - |
| Middle | 301 | -0.85 | 1.01 | (-1.01,-0.70) | 14.0 | (8.9-21.5) | 0.013 | 1.5 | (0.7-3.1) | 0.004 | 0.1 | (0.1-0.1) | 0.1 | (0.1-0.1) |
| Fourth | 317 | -0.77 | 1.14 | (-0.93,-0.61) | 10.9 | (7.7-15.2) |  | 2.5 | (1.5-4.0) |  | 1.5 | (0.5-4.5) | 0.5 | (0.1-3.2) |
| Highest | 260 | -0.57 | 0.99 | (-0.74,-0.40) | 7.5 | (4.6-12.1) |  | 0.3 | (0.1-1.1) |  | 0.8 | (0.2-4.0) | 0.0 | - |

Table 10.3: Cont'd.


Table 10.4: Mean height-for-age z-score (HAZ) and the Prevalence of Stunting in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean z-score (95\% CI) |  |  | <-2 z-score (Stunted) |  |  | <-3 z-score (Severely stunted) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\underset{\text { z-score }}{\text { CI }}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 200 | -1.42 | 0.98 | (-1.58,-1.27) | 25.7 | (18.5-34.6) |  | 7.0 | (4.0-11.9) |  |
| Central | 202 | -1.54 | 1.21 | (-1.64,-1.44) | 31.5 | (25.1-38.6) |  | 11.0 | (7.4-15.9) |  |
| Western | 185 | -1.44 | 1.22 | (-1.59,-1.29) | 29.7 | (24.2-35.7) | 0.013 | 8.9 | (6.5-12.1) | 0.108 |
| Mid-western | 186 | -1.83 | 1.04 | (-2.08,-1.59) | 41.5 | (31.8-52.0) |  | 13.9 | (7.9-23.2) |  |
| Far-western | 208 | -1.80 | 1.02 | (-1.95,-1.65) | 39.5 | (32.6-46.9) |  | 15.5 | (11.5-20.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 150 | -1.93 | 1.06 | (-2.10,-1.75) | 45.1 | (37.6-52.8) |  | 17.3 | (11.2-25.7) |  |
| Hill | 415 | -1.59 | 1.10 | (-1.68,-1.50) | 34.7 | (30.1-39.5) | 0.007 | 10.5 | (8.1-13.5) | 0.119 |
| Terai | 416 | -1.49 | 1.16 | (-1.59,-1.38) | 28.1 | (22.9-33.9) |  | 9.7 | (6.9-13.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 140 | -1.35 | 1.19 | (-1.64,-1.06) | 26.6 | (19.5-35.1) |  | 7.2 | (4.0-12.7) |  |
| Rural | 841 | -1.60 | 1.12 | (-1.67,-1.52) | 32.8 | (28.9-37.1) |  | 11.1 | (8.9-13.7) | 0.181 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 10-14 | 599 | -1.59 | 1.26 | (-1.70,-1.48) | 35.6 | (31.6-39.9) |  | 13.3 | (10.9-16.0) |  |
| 15-19 | 382 | -1.51 | 0.91 | (-1.62,-1.41) | 26.4 | (21.1-32.3) |  | 6.3 | (3.8-10.3) | <0.001 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 7 | * | * | * | * | * |  | * | * |  |
| Primary ${ }^{\text {b }}$ | 318 | -1.81 | 1.27 | (-1.98,-1.64) | 43.3 | (37.1-49.6) | <0.001 | 17.7 | (13.5-22.7) | <0.001 |
| Some secondary ${ }^{\text {c }}$ | 537 | -1.46 | 1.08 | (-1.55,-1.37) | 27.9 | (23.7-32.6) | <0.001 | 7.6 | (5.8-9.9) | <0.001 |
| SLC and above ${ }^{\text {d }}$ | 119 | -1.32 | 0.87 | (-1.48,-1.15) | 20.6 | (13.7-29.8) |  | 4.2 | (1.7-10.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 243 | -2.10 | 1.01 | (-2.22,-1.98) | 50.8 | (44.9-56.8) |  | 20.5 | (15.6-26.5) |  |
| Second | 203 | -1.84 | 1.28 | (-1.99,-1.70) | 41.0 | (34.7-47.6) |  | 19.4 | (13.5-27.1) |  |
| Middle | 197 | -1.45 | 0.90 | (-1.58,-1.32) | 23.9 | (18.2-30.7) | <0.001 | 4.0 | (1.9-8.5) | <0.001 |
| Fourth | 160 | -1.34 | 1.12 | (-1.53,-1.15) | 26.6 | (19.7-34.9) |  | 6.6 | (3.7-11.6) |  |
| Highest | 178 | -1.11 | 1.06 | (-1.28,-0.95) | 19.5 | (13.1-28.1) |  | 3.2 | (1.3-7.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 133 | -1.43 | 1.16 | (-1.62,-1.24) | 24.8 | (19.0-31.8) |  | 8.9 | (5.4-14.5) |  |
| Hill Chhetri | 250 | -1.44 | 0.78 | (-1.62,-1.27) | 31.0 | (24.7-38.1) |  | 9.4 | (6.5-13.4) |  |
| Terai Brahmin/Chhetri | 30 | (-1.35) | (1.49) | (-1.64,-1.07) | (18.5) | (4.5-52.0) |  | (2.7) | (0.5-12.3) |  |
| Other Terai Caste | 69 | -1.59 | 1.04 | (-1.86,-1.33) | 33.0 | (26.2-40.6) |  | 16.2 | (9.5-26.3) |  |
| Hill Dalit | 116 | -1.73 | 0.77 | (-1.92,-1.55) | 39.6 | (31.3-48.5) | <0.001 | 9.1 | (5.2-15.5) | 0.005 |
| Terai Dalit | 37 | (-1.78) | (0.99) | (-2.03,-1.53) | (31.6) | (18.3-48.8) |  | (10.1) | (4.6-20.5) |  |
| Newar | 34 | (-1.10) | (1.02) | (-1.39,-0.81) | (15.7) | (7.1-31.2) |  | (5.4) | (1.0-25.6) |  |
| Hill Janajati | 206 | -1.91 | 0.86 | (-2.03,-1.79) | 45.7 | (40.5-51.1) |  | 15.6 | (10.7-22.0) |  |
| Terai Janajati | 84 | -1.20 | 1.23 | (-1.46,-0.94) | 18.0 | (10.5-29.0) |  | 0.7 | (0.1-5.2) |  |
| Muslim | 22 | * | * | * | * | * |  | * | * |  |
| Total | 981 | -1.56 | 1.13 | (-1.63,-1.49) | 32.0 | (28.6-35.6) |  | 10.5 | (8.6-12.8) |  |

[^31]Table 10.5: Mean Body Mass Index (BMI)-for-age z-score (BMIZ) and the Prevalence of Wasting, Overweight and Obesity in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean z-score <br> (95\% CI) |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score <br> (Wasted) |  |  | <-3 z-score <br> (Severely wasted) |  |  | $>1$ z-score (Overweight) |  |  | $\begin{gathered} \text { >2 z-score } \\ \text { (Obese) } \end{gathered}$ |  |
|  |  | Mean <br> z-score | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\underset{\text { z-score }}{\text { CI }}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 200 | -0.93 | 1.24 | (-1.16,-0.69) | 16.2 | (11.5-22.5) |  | 1.9 | (0.5-6.8) |  |  | (1.7-14.9) |  | 1.2 | (0.2-8.1) |
| Central | 202 | -1.06 | 1.37 | (-1.34,-0.77) | 26.1 | (19.6-33.9) |  | 6.9 | (4.3-10.9) |  | 8.3 | (4.4-14.9) |  | 2.0 | (0.5-7.5) |
| Western | 184 | -1.11 | 1.17 | (-1.31,-0.91) | 25.6 | (19.7-32.6) | 0.046 | 5.6 | (3.1-9.9) | 0.107 | 1.6 | (0.6-4.5) | 0.001 | 0.0 | (0.0-0.1) |
| Mid-western | 188 | -1.20 | 1.08 | (-1.38,-1.03) | 21.8 | (16.4-28.3) |  | 6.0 | (2.9-12.2) |  | 3.2 | (1.2-8.0) |  | 0.6 | (0.1-4.1) |
| Far-western | 208 | -1.50 | 0.93 | (-1.64,-1.36) | 27.3 | (21.5-33.9) |  | 6.5 | (3.7-11.0) |  | 0.4 | (0.1-2.9) |  | 0.0 | - |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 150 | -1.15 | 1.03 | (-1.33,-0.98) | 22.1 | (15.8-30.1) |  | 3.0 | (1.0-8.1) |  | 1.5 | (0.2-9.2) |  | 0.0 | (0.0-0.2) |
| Hill | 416 | -0.98 | 1.18 | (-1.15,-0.82) | 18.2 | (15.0-22.0) | 0.004 | 4.3 | (2.8-6.6) | 0.237 | 5.6 | (2.7-11.5) | 0.324 | 1.0 | (0.1-6.4) |
| Terai | 416 | -1.20 | 1.29 | (-1.39,-1.00) | 27.6 | (22.5-33.4) |  | 6.5 | (4.4-9.6) |  | 4.5 | (2.3-8.5) |  | 1.2 | (0.3-4.0) |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 140 | -0.85 | 1.47 | (-10.8,-0.62) | 22.5 | (18.5-27.2) | 0.798 | 6.5 | (3.7-11.1) | 0.526 | 9.7 | (5.1-17.6) | 0.005 | 3.9 | (1.2-11.5) |
| Rural | 842 | -1.15 | 1.18 | (-1.28,-1.01) | 23.5 | (20.0-27.4) | 崖 | 5.2 | (3.7-7.1) | . 526 | 3.9 | (2.1-7.3) | .005 | 0.6 | (0.1-2.9) |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-14 | 598 | -1.22 | 1.28 | (-1.35,-1.08) | 27.8 | (23.8-32.2) | 001 | 6.9 | (4.8-9.8) | 0.009 | 4.8 | (2.8-8.1) | 0.945 | 1.0 | (0.3-3.5) |
| 15-19 | 384 | -0.93 | 1.13 | (-1.09,-0.78) | 16.5 | (11.5-23.1) |  | 3.0 | (1.7-5.3) | , | 4.7 | (2.6-8.3) | . 945 | 1.0 | (0.1-6.9) |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 7 | * | * | * | * | * |  | * | * |  | * | * |  | * | * |
| Primary ${ }^{\text {b }}$ | 316 | -1.39 | 1.32 | (-1.57,-1.20) | 33.2 | (27.9-39.0) | <0.001 | 9.1 | (5.9-13.8) | 0.001 | 4.4 | (1.9-10.0) | 0.318 | 1.7 | (0.4-6.6) |
| Some secondary ${ }^{\text {c }}$ | 539 | -1.04 | 1.15 | (-1.16,-0.93) | 19.7 | (16.3-23.7) | -0.001 | 3.8 | (2.3-6.2) | 0.001 | 4.4 | (2.6-7.6) | 0.318 | 0.1 | (0.0-1.0) |
| SLC and above ${ }^{\text {d }}$ | 120 | -0.68 | 1.16 | (-0.96,-0.39) | 12.7 | (7.5-20.7) |  | 2.1 | (1.3-3.4) |  | 7.2 | (3.1-15.9) |  | 3.0 | (0.5-16.6) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 243 | -1.45 | 0.87 | (-1.57,-1.34) | 26.2 | (21.2-31.8) |  | 3.9 | (2.2-6.8) |  | 0.0 | - |  | 0.0 | - |
| Second | 202 | -10.5 | 1.19 | (-1.29,-0.82) | 21.9 | (16.5-28.6) |  | 7.1 | (4.6-11.0) |  |  | (0.7-11.3) |  | 0.0 | - |
| Middle | 197 | -1.16 | 1.23 | (-1.39,-0.93) | 24.5 | (17.5-33.2) | 0.642 | 4.6 | (2.2-9.7) | 0.304 | 2.7 | (1.0-7.3) | $<0.001$ | 1.3 | (0.2-8.5) |
| Fourth | 162 | -1.11 | 1.25 | (-1.28,-0.93) | 24.6 | (18.1-32.5) |  | 3.5 | (1.3-9.4) |  |  | (1.6-11.5) |  | 1.9 | (0.4-8.5) |
| Highest | 178 | -0.79 | 1.42 | (-1.15,-0.44) | 20.0 | (14.7-26.6) |  | 7.2 | (4.1-12.2) |  | 13.1 | (7.0-23.0) |  | 1.9 | (0.3-11.7) |

Table 10.5: Cont'd..

| Characteristics | N | Mean z-score(95\% CI) |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score <br> (Wasted) |  |  | $<-3 \text { z-score }$ <br> (Severely wasted) |  |  | $>1$ z-score (Overweight) |  |  | $\begin{gathered} \hline \text { >2 z-score } \\ \text { (Obese) } \\ \hline \end{gathered}$ |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \mathrm{CI} \\ \text { z-score } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 134 | -1.20 | 1.28 | (-1.47,-0.94) | 27.5 | (21.7-34.1) |  | 9.5 | (6.5-13.8) |  |  | (2.3-16.4) |  | 0.0 | - |
| Hill Chhetri | 252 | -1.11 | 1.19 | (-1.33,-0.89) | 19.7 | (15.4-24.9) |  | 5.4 | (2.9-10.1) |  |  | (2.0-12.1) |  | 2.5 | (0.5-12.3) |
| Terai Brahmin/Chhetri | 30 | (-1.41) | (0.94) | (-1.62,-1.19) | (21.7) | (13.4-33.4) |  | (5.6) | (2.7-11.2) |  | (0.0) | - |  | (0.0) | - |
| Other Terai Caste | 68 | -1.49 | 1.43 | (-1.92,-1.06) | 44.6 | (29.6-60.6) |  | 8.6 | (4.7-15.1) |  | 8.5 | (3.3-20.6) |  | 2.0 | (0.3-11.9) |
| Hill Dalit | 116 | -0.95 | 1.11 | (-1.20,-0.71) | 17.1 | (11.7-24.3) |  | 2.6 | (1.0-6.8) |  | 1.8 | (0.6-5.7) |  | 0.0 | - |
| Terai Dalit | 37 | (-1.16) | (1.51) | (-1.72,-0.59) | (25.8) | (16.5-38.0) | <0.001 | (6.6) | (1.8-21.2) | 0.027 | (4.2) | (0.8-19.5) | 0.002 | (4.2) | (0.8-19.5) |
| Newar | 34 | (-0.40) | (1.19) | (-1.14,0.34) | (9.9) | (2.3-34.0) |  | (3.0) | (0.3-26.9) |  | (14.9) | (4.7-38.0) |  | (0.0) | - |
| Hill Janajati | 206 | -0.89 | 0.93 | (-1.01,-0.78) | 12.9 | (9.8-16.8) |  | 0.9 | (0.1-6.2) |  |  | (0.2-3.6) |  | 0.0 | (0.0-0.1) |
| Terai Janajati | 83 | -1.09 | 1.22 | (-1.55,-0.63) | 21.5 | (12.7-33.8) |  | 3.9 | (1.2-11.5) |  | 5.5 | (1.2-21.5) |  | 0.0 | - |
| Muslim | 22 | * | * | (-2.03,-0.80) | * | * |  | * | * |  | * | * |  | * | * |
| Total | 982 | -1.11 | 1.23 | (-1.23,-0.98) | 23.3 | (20.3-26.7) |  | 5.3 | (4.0-7.1) |  | 4.8 | (2.9-7.7) |  | 1.0 | (0.4-2.9) |

[^32]z-scores are calculated using 2007 WHO growth reference 5-19 years.
CI-Confidence Interval
a Includes those who have never attended school.
${ }^{\text {I }}$ Includes those who have completed $0-5$ years of school.
${ }^{\text {I }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 10.6: Mean height-for-age z-score (HAZ) and the Prevalence of Stunting in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\begin{gathered} \text { Mean z-score } \\ \text { (95\% CI) } \\ \hline \end{gathered}$ |  |  | $\begin{aligned} & \text { <-2 z-score } \\ & \text { (Stunted) } \end{aligned}$ |  |  | $<-3 \mathrm{z}$-score(Severely stunted) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{array}{\|c} \hline \text { Mean } \\ \text { z-score } \end{array}$ | $\underset{\text { z-score }}{\text { SD }}$ | $\begin{gathered} \text { (95\% CI) } \\ \text { z-score } \end{gathered}$ | \% | (95\% CI) | pvalue | \% | (95\% CI) | $\begin{gathered} \mathbf{p}- \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 328 | -1.59 | 0.94 | (-1.71,-1.45) | 28.0 | (21.6-35.5) |  | 8.1 | (4.7-13.6) |  |
| Central | 326 | -1.56 | 1.03 | (-1.73,-1.34) | 30.7 | (24.7-37.4) |  | 6.3 | (3.5-11.3) |  |
| Western | 328 | -1.57 | 1.01 | (-1.72,-1.42) | 31.1 | (25.4-37.5) | 0.014 | 6.1 | (4.2-8.8) | 0.028 |
| Mid-western | 348 | -1.83 | 0.98 | (-1.98,-1.68) | 40.7 | (34.8-46.9) |  | 11.1 | (7.9-15.3) |  |
| Far-western | 392 | -1.78 | 1.06 | (-1.93,-1.63) | 35.5 | (28.9-42.6) |  | 11.9 | (8.1-17.2) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 272 | -1.79 | 1.02 | (-1.92,-1.66) | 39.6 | (34.7-44.7) |  | 9.5 | (5.0-17.3) |  |
| Hill | 713 | -1.63 | 0.95 | (-1.71,-1.56) | 32.5 | (29.2-35.9) | 0.126 | 7.6 | (6.3-9.2) | 0.784 |
| Terai | 737 | -1.60 | 1.05 | (-1.74,-1.46) | 30.6 | (25.4-36.4) |  | 8.1 | (5.5-11.8) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 196 | -1.25 | 1.02 | (-1.56,-0.93) | 19.5 | (12.0-30.0) | <0.001 | 5.0 | (2.2-11.1) | 0.154 |
| Rural | 1,526 | -1.67 | 1.00 | (-1.75,-1.60) | 33.5 | (30.3-36.8) | <0.001 | 8.3 | (6.7-10.3) | 0.154 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 10-14 | 995 | -1.63 | 1.12 | (-1.73,-1.53) | 34.0 | (30.2-38.1) | 0.043 | 10.8 | (8.9-13.1) | <0.001 |
| 15-19 | 727 | -1.63 | 0.83 | (-1.70,-1.55) | 29.4 | (25.7-33.4) | 0.043 | 4.1 | (2.5-6.5) | <0.001 |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 49 | (-1.99) | (0.90) | (-2.40,-1.58) | (37.8) | (25.7-51.7) |  | (17.8) | (7.4-37.0) |  |
| Primary ${ }^{\text {b }}$ | 523 | -1.86 | 1.23 | (-2.00,-1.72) | 45.3 | (39.4-51.3) | $<0.001$ | 15.2 | (12.2-18.8) | <0.001 |
| Some secondary ${ }^{\text {c }}$ | 938 | -1.54 | 0.88 | (-1.60,-1.47) | 27.6 | (24.9-30.5) | <0.001 | 4.7 | (3.3-6.6) | <0.001 |
| SLC and above ${ }^{\text {d }}$ | 211 | -1.34 | 0.80 | (-1.45,-1.23) | 17.3 | (13.1-22.5) |  | 0.9 | (0.2-4.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 464 | -2.05 | 0.99 | (-2.15,-1.94) | 49.1 | (44.4-53.9) |  | 16.0 | (12.7-20.1) |  |
| Second | 398 | -1.69 | 0.92 | (-1.82,-1.57) | 33.5 | (28.2-39.2) |  | 6.9 | (4.9-9.7) |  |
| Middle | 317 | -1.63 | 0.94 | (-1.76,-1.50) | 30.8 | (25.7-36.4) | $<0.001$ | 6.2 | (3.3-11.2) | <0.001 |
| Fourth | 287 | -1.50 | 0.97 | (-1.64,-1.36) | 24.7 | (19.3-31.0) |  | 5.9 | (3.5-9.7) |  |
| Highest | 256 | -1.10 | 1.00 | (-1.29,-0.91) | 16.0 | (11.3-22.1) |  | 2.6 | (0.9-6.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 204 | -1.36 | 0.94 | (-1.54,-1.18) | 21.3 | (15.3-29.0) |  | 4.4 | (2.1-9.0) |  |
| Hill Chhetri | 419 | -1.60 | 0.94 | (-1.71,-1.48) | 29.9 | (25.5-34.7) |  | 7.9 | (5.5-11.2) |  |
| Terai Brahmin/Chhetri | 41 | (-1.38) | (0.89) | (-1.68,-1.08) | (17.0) | (7.1-35.6) |  | (6.1) | (1.2-25.6) |  |
| Other Terai Caste | 121 | -1.75 | 1.27 | (-2.20,-1.31) | 40.3 | (26.3-56.1) |  | 12.2 | (5.2-26.1) |  |
| Hill Dalit | 212 | -1.80 | 1.06 | (-2.01,-1.58) | 40.4 | (32.0-49.4) | $<0.001$ | 11.2 | (7.3-17.0) | $<0.001$ |
| Terai Dalit | 85 | -2.02 | 0.84 | (-2.21,-1.84) | 40.9 | (29.3-53.6) |  | 13.1 | (6.5-24.8) |  |
| Newar | 49 | (-1.19) | (0.81) | (-1.51,-0.88) | (23.1) | (11.5-41.1) |  | (0.0) | - |  |
| Hill Janajati | 381 | -1.76 | 0.95 | (-1.86,-1.65) | 36.6 | (32.3-41.2) |  | 8.4 | (6.4-11.0) |  |
| Terai Janajati | 175 | -1.25 | 0.86 | (-1.44,-1.07) | 19.0 | (12.2-28.4) |  | 1.4 | (0.4-4.7) |  |
| Muslim | 35 | (-1.82) | (1.22) | (-2.39,-1.25) | (40.5) | (24.7-58.6) |  | (11.8) | (5.9-22.4) |  |
| Total | 1,722 | -1.63 | 1.01 | (-1.70,-1.55) | 32.1 | (29.1-35.3) |  | 8.0 | (6.4-9.9) |  |

[^33]Table 10.7: Mean Body Mass Index (BMI)-for-age z-score (BMIZ) and the Prevalence of Wasting, Overweight and Obesity in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\begin{gathered} \text { Mean } \\ \text { z-score }(95 \% \mathrm{CI}) \end{gathered}$ |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score (Wasted) |  |  | <-3 z-score <br> (Severely wasted) |  |  | >1 z-score (Overweight) |  |  | $\begin{gathered} >2 \text { z-score } \\ \text { (Obese) } \\ \hline \end{gathered}$ |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \hline \text { (95\% CI) } \\ \text { z-score } \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 328 | -0.74 | 1.17 | (-0.92,-0.55) | 13.6 | (9.2-19.7) |  | 3.6 | (2.1-6.2) |  | 7.5 | (4.6-12.0) |  | 1.9 | (1.0-3.5) |
| Central | 325 | -0.86 | 1.09 | (-0.96,-0.76) | 16.5 | (12.9-20.9) |  | 4.0 | (2.2-7.0) |  | 4.1 | (2.9-6.0) |  | 0.6 | (0.1-3.8) |
| Western | 327 | -0.72 | 1.03 | (-0.82,-0.61) | 9.9 | (8.0-12.3) | 0.102 | 2.5 | (1.0-5.9) | 0.345 | 2.9 | (1.3-6.3) | 0.004 | 0.4 | (0.1-1.5) |
| Mid-western | 349 | -0.91 | 1.05 | (-1.04,-0.77) | 14.4 | (10.2-19.9) |  | 1.6 | (0.6-4.1) |  | 3.6 | (1.9-6.6) |  | 0.2 | (0.0-1.5) |
| Far-western | 393 | -0.99 | 0.96 | (-0.10,-0.88) | 14.1 | (10.6-18.5) |  | 1.9 | (1.0-3.5) |  | 1.7 | (0.9-3.5) |  | 0.2 | (0.0-1.5) |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 272 | -0.76 | 1.00 | (-0.92,-0.60) | 10.6 | (7.0-15.7) |  | 1.0 | (0.2-4.8) |  | 3.0 | (1.4-6.3) |  | 0.0 | (0.0-0.1) |
| Hill | 714 | -0.75 | 1.05 | (-0.81,-0.69) | 12.7 | (10.9-14.7) | 0.134 | 2.3 | (1.6-3.2) | 0.048 | 4.1 | (2.8-5.8) | 0.666 | 0.6 | (0.2-2.4) |
| Terai | 736 | -0.89 | 1.11 | (-1.00,-0.79) | 15.6 | (12.3-19.5) |  | 4.0 | (2.5-6.3) |  | 4.7 | (3.1-6.9) |  | 0.9 | (0.5-1.7) |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 196 | -0.53 | 1.12 | (-0.74,-0.32) | 9.8 | (6.4-14.8) | 0.098 | 2.1 | (0.9-5.0) | 0.542 | 9.9 | (5.8-16.6) | $<0.001$ | 1.9 | (0.5-6.7) |
| Rural | 1,526 | -0.86 | 1.07 | (-0.92,-0.79) | 14.4 | (12.4-16.7) | 0.098 | 3.1 | (2.2-4.4) | 0.542 | 3.7 | (2.6-5.1) | . 001 | 0.6 | (0.3-1.4) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $10-14$ | 995 | -0.99 | 1.14 | (-1.07,-0.91) | 18.3 | (15.6-21.4) |  | 4.6 | (3.2-6.6) |  | 4.3 | (2.9-6.2) |  | 0.9 | (0.4-2.2) |
| 15-19 | 727 | -0.59 | 0.95 | (-0.66,-0.52) | 7.9 | (6.3-10.0) | <0.001 | 0.8 | $(0.3-2.0)$ | <0.001 | 4.3 | (3.0-6.2) | 0.997 | 0.5 | (0.1-2.0) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 49 | (-0.77) | (1.02) | (-10.3,-0.52) | (11.3) | (6.1-20.2) |  | (5.0) | (1.6-14.5) |  | (2.2) | (0.3-16.0) |  | 0.0 | - |
| Primary ${ }^{\text {b }}$ | 523 | -1.17 | 1.12 | (-1.28,-1.07) | 21.9 | (17.9-26.5) | $<0.001$ | 5.4 | (3.7-7.8) | 001 | 3.9 | (2.4-6.2) | 587 | 0.9 | (0.3-2.8) |
| Some secondary ${ }^{\text {c }}$ | 938 | -0.69 | 1.05 | (-0.78,-0.61) | 11.3 | (9.5-13.5) | <0.001 | 1.9 | (1.1-3.1) | , 001 | 4.9 | (3.5-6.9) | . 587 | 0.9 | (0.4-2.0) |
| SLC and above ${ }^{\text {d }}$ | 211 | -0.56 | 0.93 | (-0.68,-0.44) | 7.0 | (4.1-11.4) |  | 1.6 | (0.6-4.0) |  | 3.6 | (1.8-7.0) |  | 0.0 | - |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 465 | -1.05 | 1.05 | (-1.16,-0.94) | 18.7 | (15.4-22.6) |  | 3.8 | (2.3-6.4) |  | 1.8 | (1.1-3.1) |  | 0.1 | (0.0-0.8) |
| Second | 398 | -0.82 | 0.97 | (-0.95,-0.69) | 10.7 | (7.6-14.8) |  | 2.6 | (1.6-4.4) |  | 2.6 | (1.3-4.9) |  | 0.0 | - |
| Middle | 317 | -0.87 | 1.06 | (-1.05,-0.69) | 15.6 | (9.8-23.9) | 0.001 | 2.7 | (1.1-6.2) | 0.861 | 3.2 | (1.8-5.7) | $<0.001$ | 0.0 | - |
| Fourth | 286 | -0.88 | 1.05 | (-1.03,-0.72) | 15.3 | (10.4-21.8) |  | 3.3 | (1.3-7.9) |  | 3.7 | (2.0-6.8) |  | 0.2 | (0.0-1.4) |
| Highest | 256 | -0.40 | 1.20 | (-0.53,-0.27) | 8.3 | (5.6-12.2) |  | 2.7 | (1.2-5.8) |  | 12.1 | (8.6-16.7) |  | 4.1 | (2.1-7.7) |

Table 10.7: Cont'd.

| Characteristics | N | $\begin{gathered} \text { Mean } \\ \text { z-score }(95 \% \mathrm{CI}) \end{gathered}$ |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | <-2 z-score (Wasted) |  |  | $<-3 \text { z-score }$ <br> (Severely wasted) |  |  | $>1 \text { z-score }$ <br> (Overweight) |  |  | $\begin{gathered} \hline>2 \text { z-score } \\ \text { (Obese) } \\ \hline \end{gathered}$ |  |
|  |  | $\begin{gathered} \text { Mean } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { SD } \\ \text { z-score } \end{gathered}$ | $\begin{gathered} \text { (95\% CI) } \\ \text { z-score } \\ \hline \end{gathered}$ | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 204 | -0.75 | 1.16 | (-0.91,-0.58) | 14.3 | (10.9-18.7) |  | 2.2 | (1.0-4.9) |  | 4.5 | (2.1-9.4) |  | 3.0 | (1.1-8.0) |
| Hill Chhetri | 419 | -0.87 | 0.93 | (-0.97,-0.76) | 11.6 | (8.7-15.3) |  | 1.1 | (0.5-2.4) |  | 1.8 | (0.9-3.8) |  | 0.5 | (0.1-3.4) |
| Terai Brahmin/Chhetri | 41 | (-0.97) | (1.08) | (-1.47,-0.48) | (16.5) | (9.8-26.4) |  | (2.7) | (1.3-5.7) |  | (3.4) | (0.4-21.7) |  | (0.0) |  |
| Other Terai Caste | 120 | -1.16 | 1.09 | (-1.31,-1.01) | 21.6 | (13.6-32.5) |  | 6.9 | (2.5-17.4) |  | 2.1 | (0.6-7.1) |  | 0.0 |  |
| Hill Dalit | 214 | -0.75 | 1.04 | (-0.92,-0.58) | 9.3 | (6.4-13.2) | <0.001 | 2.0 | (0.7-5.6) | <0.001 | 3.9 | (1.7-8.4) | <0.001 | 1.0 | (0.3-3.2) |
| Terai Dalit | 85 | -1.22 | 1.05 | (-1.43,-1.01) | 26.4 | (17.4-38.0) |  | 6.8 | (3.1-14.4) | <0.001 | 2.6 | (0.6-10.4) | <0.001 | 0/0 |  |
| Newar | 49 | (-0.39) | (1.31) | (-0.72,-0.05) | (12.4) | (6.3-22.8) |  | (4.2) | (1.3-13.0) |  | (16.9) | (9.2-29.1) |  | (4.2) | (0.6-25.0) |
| Hill Janajati | 380 | -0.58 | 1.04 | (-0.69,-0.48) | 10.2 | (8.1-12.7) |  | 1.9 | (1.1-3.3) |  | 5.2 | (3.5-7.6) |  | 0.3 | (0.1-1.2) |
| Terai Janajati | 175 | -0.72 | 1.01 | (-0.98,-0.45) | 9.7 | (5.3-17.3) |  | 1.6 | (0.5-5.3) |  | 7.0 | (3.3-14.5) |  | 0.0 |  |
| Muslim | 35 | (-1.23) | (1.29) | (-1.44,-1.03) | (21.8) | (10.8-38.9) |  | (9.8) | (4.4-22.3) |  | (5.6) | (1.0-24.8) |  | (0.0) |  |
| Total | 1,722 | -0.82 | 1.08 | (-0.88,-0.76) | 14.0 | (12.1-16.1) |  | 3.0 | (2.2-4.2) |  | 4.3 | (3.3-5.6) |  | 0.7 | (0.4-1.4) |
| Note: N unweighted. All estimates account for weighting and complex sample design. Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. z-scores are calculated using 2007 WHO growth reference 5-19 years. CI-Confidence Interval |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. For obese stratifications, no significant test were performed because the very low prevalence. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 10.8: Mean Height and Weight, and Prevalence of Stunting in Non-Pregnant Women 15-49 Years in Nepal, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean (95\% CI) |  |  |  |  |  | Height < 145 cm, \% |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Height (cm) |  |  | Weight (kg) |  |  |  |  |  |
|  |  | Mean | SD | CI | Mean | SD | CI | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 425 | 150.5 | 7.43 | (149.5-151.5) | 50.3 | 9.30 | (49.1-51.5) | 15.6 | (11.7-20.5) |  |
| Central | 428 | 151.4 | 5.68 | (150.9-151.8) | 52.7 | 10.73 | (51.6-53.7) | 10.4 | (8.5-12.8) |  |
| Western | 427 | 151.7 | 4.78 | (151.2-152.2) | 52.3 | 9.74 | (51.0-53.7) | 8.0 | (5.5-11.5) | 0.001 |
| Mid-western | 430 | 151.4 | 5.45 | (150.6-152.1) | 49.5 | 8.68 | (48.5-50.6) | 11.1 | (8.4-14.5) |  |
| Far-western | 429 | 153.0 | 5.54 | (152.3-153.6) | 48.6 | 8.17 | (47.5-49.8) | 6.2 | (4.0-9.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 359 | 151.7 | 5.99 | (151.0-152.4) | 50.2 | 8.89 | (48.9-51.4) | 12.9 | (10.2-16.3) |  |
| Hill | 893 | 151.8 | 5.10 | (151.4-152.2) | 52.4 | 10.19 | (51.6-53.2) | 8.2 | (6.7-10.0) | 0.003 |
| Terai | 887 | 151.0 | 6.58 | (150.4-151.5) | 50.5 | 9.56 | (49.6-51.3) | 12.8 | (10.6-15.4) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 295 | 151.6 | 5.81 | (150.7-152.5) | 52.9 | 10.20 | (51.2-54.7) | 14.0 | (9.7-19.9) | 0.058 |
| Rural | 1,844 | 151.3 | 5.98 | (151.0-151.7) | 51.0 | 9.76 | (50.3-51.7) | 10.3 | (8.8-12.1) | 0.058 |
| Age, years |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 233 | 151.5 | 5.78 | (150.6-152.3) | 45.0 | 6.52 | (44.2-45.8) | 10.8 | (5.9-19.2) |  |
| 20-29 | 861 | 151.5 | 6.65 | (150.9-152.1) | 50.2 | 8.61 | (49.4-50.9) | 9.6 | (7.7-11.8) | 0.407 |
| 30-39 | 670 | 151.4 | 5.42 | (150.9-151.9) | 53.3 | 10.30 | (52.3-54.4) | 12.2 | (9.9-15.0) | 0.407 |
| 40-49 | 375 | 151.0 | 5.21 | (150.4-151.6) | 53.7 | 11.27 | (52.2-55.2) | 11.1 | (7.9-15.4) |  |
| Education |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 709 | 150.9 | 5.48 | (150.3-151.4) | 49.9 | 9.21 | (49.1-50.7) | 13.9 | (11.4-16.8) |  |
| Primary ${ }^{\text {b }}$ | 363 | 150.6 | 6.97 | (149.7-151.5) | 52.2 | 10.94 | (50.8-53.6) | 13.9 | (10.3-18.4) | <0, |
| Some secondary ${ }^{\text {c }}$ | 551 | 151.5 | 5.53 | (150.9-152.0) | 51.3 | 9.83 | (50.3-52.3) | 9.1 | (6.7-12.2) | <0.001 |
| SLC and above ${ }^{\text {d }}$ | 516 | 152.4 | 6.09 | (151.7-153.0) | 52.3 | 9.71 | (51.4-53.2) | 6.9 | (4.6-10.3) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 492 | 150.6 | 5.40 | (150.1-151.2) | 47.2 | 7.13 | (46.5-48.0) | 14.6 | (11.4-18.5) |  |
| Second | 444 | 151.1 | 5.42 | (150.5-151.7) | 49.8 | 9.15 | (48.8-50.7) | 12.9 | (10.0-16.4) |  |
| Middle | 408 | 150.7 | 7.75 | (149.7-151.8) | 49.8 | 9.65 | (48.4-51.1) | 8.9 | (6.1-12.9) | 0.017 |
| Fourth | 399 | 151.5 | 5.23 | (151.0-152.0) | 51.2 | 9.26 | (50.4-52.1) | 11.4 | (8.6-14.8) |  |
| Highest | 396 | 152.4 | 5.42 | (151.7-153.1) | 56.1 | 10.53 | (55.0-57.2 | 8.1 | (5.4-12.0) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 281 | 152.4 | 5.18 | (151.8-153.0) | 53.6 | 10.41 | (52.1-55.1) | 8.3 | (5.6-11.9) |  |
| Hill Chhetri | 509 | 151.9 | 5.45 | (151.4-152.5) | 51.0 | 9.97 | (49.9-52.1) | 8.1 | (6.0-10.8) |  |
| Terai Brahmin/Chhetri | 60 | 149.6 | 12.59 | (144.7-154.6) | 50.6 | 10.55 | (46.2-55.1) | 16.8 | (6.6-36.5) |  |
| Other Terai Caste | 128 | 150.2 | 5.37 | (149.2-151.2) | 46.7 | 7.41 | (45.3-48.1) | 15.8 | (10.7-22.7) |  |
| Hill Dalit | 266 | 151.3 | 4.85 | (150.6-152.0) | 51.0 | 9.18 | (49.3-52.6) | 8.9 | (6.1-12.7) | <0.001 |
| Terai Dalit | 91 | 150.3 | 5.11 | (149.4-151.2) | 48.2 | 10.48 | (45.1-51.4) | 18.5 | (11.8-27.9) | <0.001 |
| Newar | 73 | 152.7 | 5.93 | (151.0-154.5) | 55.9 | 11.72 | (53.3-58.6) | 7.2 | (3.6-13.7) |  |
| Hill Janajati | 494 | 151.1 | 5.15 | (150.6-151.7) | 53.3 | 9.30 | (52.3-54.2) | 11.1 | (8.3-14.9) |  |
| Terai Janajati | 198 | 151.8 | 6.95 | (150.6-153.0) | 49.9 | 8.49 | (48.1-51.6) | 7.1 | (3.8-13.1) |  |
| Muslim | 37 | (149.7) | (6.20) | (147.1-152.2) | (47.6) | (7.16) | (44.9-50.3) | (25.8) | (14.3-42.0) |  |
| Total | 2,139 | 151.4 | 5.96 | (151.1-151.7) | 51.3 | 9.85 | (50.7-51.9) | 10.8 | (9.5-12.3) |  |

[^34]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
CI-Confidence Interval
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Includes those who have never attended school.
${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {c I Includes the }}$ those have completed 6-9 years of school.
${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

| Characteristics | N | Mean (95\% CI) |  |  | BMI Categories ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | BMI ( $\mathrm{kg} / \mathrm{m}^{2}$ ) |  |  | $<18.5 \mathrm{~kg} / \mathrm{m}^{2}$(Thiness/Underweight) |  |  | $\begin{gathered} 18.5-24.9 \mathrm{~kg} / \mathrm{m}^{2} \\ (\text { Normal) } \\ \hline \end{gathered}$ |  |  | $\begin{gathered} 25.0-29.9 \mathrm{~kg} / \mathrm{m}^{2} \\ \text { (Overweight) } \\ \hline \end{gathered}$ |  |  | $\begin{gathered} >30.0 \mathrm{~kg} / \mathrm{m}^{2} \\ \text { (Obese) } \end{gathered}$ |  |  |
|  |  | Mean | SD | CI | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 425 | 22.2 | 3.53 | (21.7-22.6) | 12.8 | (9.8-16.6) |  | 67.1 | (61.6-72.2) |  | 18.0 | (13.1-24.3) |  | 2.1 | (1.4-3.1) |  |
| Central | 428 | 23.0 | 4.52 | (22.6-23.4) | 13.2 | (10.7-16.3) |  | 57.5 | (53.6-61.3) |  | 21.4 | (18.3-25.0) |  | 7.9 | (5.9-10.5) |  |
| Western | 427 | 22.7 | 3.95 | (22.1-23.3) | 13.9 | (10.5-18.1) | 0.002 | 59.3 | (54.4-64.0) | <0.001 | 21.8 | (16.2-28.6) | <0.001 | 5.0 | (3.3-7.6) | <0.001 |
| Mid-western | 430 | 21.6 | 3.44 | (21.2-22.0) | 14.6 | (10.2-20.5) |  | 70.3 | (65.2-74.9) |  | 12.3 | (10.2-14.9) |  | 2.6 | (1.2-5.3) |  |
| Far-western | 429 | 20.8 | 3.19 | (20.3-21.2) | 24.0 | (20.1-28.5) |  | 65.2 | (61.9-68.3) |  | 10.3 | (7.2-14.5) |  | 0.5 | (0.1-2.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 359 | 21.8 | 3.67 | (21.3-22.3) | 15.6 | (12.8-18.9) |  | 67.1 | (63.5-70.5) |  | 12.9 | (8.8-18.4) |  | 4.5 | (2.7-7.3) |  |
| Hill | 893 | 22.7 | 4.14 | (22.4-23.1) | 12.0 | (9.8-14.7) | 0.020 | 62.1 | (59.0-65.2) | 0.502 | 19.1 | (16.4-22.1) | 0.199 | 6.7 | (5.0-9.0) | <0.001 |
| Terai | 887 | 22.1 | 3.91 | (21.8-22.5) | 16.4 | (14.0-19.1) |  | 62.1 | (58.7-65.4) |  | 18.6 | (15.4-22.4) |  | 2.8 | (2.1-3.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 295 | 23.0 | 4.20 | (22.4-23.7) | 14.3 | (10.9-18.6) |  | 54.8 | (48.0-61.5) |  | 25.0 | (19.6-31.2) |  | 5.9 | (3.4-10.1) |  |
| Rural | 1,844 | 22.3 | 3.97 | (22.0-22.5) | 14.5 | (12.6-16.5) | 0.953 | 63.6 | (61.1-66.0) | 0.004 | 17.4 | (15.1-20.0) | 0.002 | 4.4 | (3.3-5.9) | . 276 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 233 | 19.6 | 2.36 | (19.3-19.9) | 32.6 | (26.5-39.5) |  | 63.6 | (57.3-69.5) |  | 3.7 | (1.9-7.2) |  | 0.0 | (0.0-0.0) |  |
| 20-29 | 861 | 21.9 | 3.57 | (21.6-22.1) | 14.7 | (12.0-17.9) | <0.001 | 68.0 | (63.9-71.8) | <0.001 | 14.4 | (11.8-17.5) | <0.001 | 2.8 | (1.8-4.4) | <0.001 |
| 30-39 | 670 | 23.2 | 4.09 | (22.8-23.6) | 9.5 | (7.1-12.4) |  | 60.0 | (54.9-64.8) |  | 25.0 | (21.3-29.0) |  | 5.6 | (4.2-7.5) |  |
| 40-49 | 375 | 23.5 | 4.57 | (22.9-24.1) | 13.0 | (9.5-17.6) |  | 53.0 | (46.3-59.6) |  | 24.3 | (19.8-29.5) |  | 9.6 | (6.3-14.5) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 709 | 21.9 | 3.82 | (21.6-22.2) | 15.5 | (12.8-18.8) |  | 64.8 | (60.6-68.8) |  | 15.9 | (13.0-19.2) |  | 3.8 | (2.3-6.0) |  |
| Primary ${ }^{\text {c }}$ | 363 | 23.0 | 4.30 | (22.4-23.5) | 14.6 | (11.1-19.0) | 0.568 | 54.9 | (50.1-59.7) | 0.009 | 25.0 | (20.1-30.7) | 0.004 | 5.4 | (3.5-8.3) | 0.618 |
| Some secondary ${ }^{\text {d }}$ | 551 | 22.3 | 4.17 | (21.9-22.8) | 14.8 | (11.9-18.3) |  | 61.7 | (57.0-66.2) |  | 18.5 | (14.6-23.2) |  | 4.9 | (3.4-7.0) |  |
| SLC and above ${ }^{\text {e }}$ | 516 | 22.5 | 3.82 | (22.2-22.9) | 12.7 | (9.9-16.3) |  | 65.0 | (60.2-69.5) |  | 17.4 | (14.1-21.3) |  | 4.9 | (3.3-7.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 492 | 20.8 | 2.85 | (20.5-21.1) | 20.0 | (15.6-25.2) |  | 70.0 | (65.2-74.5) |  | 9.5 | (7.0-12.7) |  | 0.5 | (0.1-3.9) |  |
| Second | 444 | 21.8 | 3.84 | (21.4-22.2) | 16.3 | (12.5-20.9) |  | 66.1 | (60.1-71.5) |  | 14.2 | (11.2-17.7) |  | 3.5 | (2.3-5.3) |  |
| Middle | 408 | 21.9 | 4.12 | (21.3-22.4) | 16.8 | (12.9-21.6) | $<0.001$ | 64.9 | (59.8-69.6) | $<0.001$ | 13.8 | (10.2-18.5) | $<0.001$ | 4.3 | (2.9-6.5) | $<0.001$ |
| Fourth | 399 | 22.3 | 3.85 | (21.9-22.7) | 15.6 | (12.0-20.1) |  | 61.1 | (56.1-65.9) |  | 19.7 | (15.6-24.5) |  | 3.6 | (2.3-5.5) |  |
| Highest | 396 | 24.1 | 4.15 | (23.7-24.5) | 6.9 | (5.1-9.4) |  | 54.2 | (49.0-59.4) |  | 29.9 | (25.4-34.8) |  | 9.0 | (6.1-13.1) |  |

Table 10.9: Cont'd..

| Characteristics | N | Mean (95\% CI) |  |  | BMI Categories ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | BMI ( $\mathrm{kg} / \mathrm{m}^{2}$ ) |  |  | $<18.5 \mathrm{~kg} / \mathrm{m}^{2}$(Thiness/Underweight) |  |  | 18.5 - $24.9 \mathrm{~kg} / \mathrm{m}^{2}$ <br> (Normal) |  |  | $\begin{gathered} 25.0-29.9 \mathrm{~kg} / \mathrm{m}^{2} \\ \text { (Overweight) } \\ \hline \end{gathered}$ |  |  | $\begin{gathered} >30.0 \mathrm{~kg} / \mathrm{m}^{2} \\ \text { (Obese) } \\ \hline \end{gathered}$ |  |  |
|  |  | Mean | SD | CI | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 281 | 23.1 | 4.23 | (22.4-23.7) | 12.7 | (9.5-16.8) |  | 58.8 | (52.1-65.2) |  | 21.4 | (16.5-27.5) |  | 7.0 | (4.7-10.5) |  |
| Hill Chhetri | 509 | 22.1 | 4.04 | (21.6-22.6) | 15.0 | (11.4-19.5) |  | 66.2 | (62.8-69.5) |  | 12.5 | (9.8-15.8) |  | 6.1 | (3.3-10.9) |  |
| Terai Brahmin/Chhetri | 60 | 22.5 | 3.52 | (21.5-23.5) | 11.6 | (6.1-20.8) |  | 59.9 | (50.5-68.5) |  | 28.6 | (19.2-40.1) |  | 0.0 | - |  |
| Other Terai Caste | 128 | 20.7 | 2.94 | (20.1-21.3) | 23.0 | (17.1-30.2) |  | 67.2 | (57.8-75.5) |  | 9.8 | (5.2-17.6) |  | 0.0 | - |  |
| Hill Dalit | 266 | 22.2 | 3.73 | (21.6-22.9) | 13.3 | (9.1-19.0) | <0.001 | 64.6 | (56.4-72.0) | <0.001 | 18.9 | (11.9-28.7) | <0.001 | 3.2 | (1.6-6.4) | <0.001 |
| Terai Dalit | 91 | 21.3 | 4.57 | (19.9-22.8) | 26.1 | (18.8-34.9) |  | 56.3 | (40.5-70.9) |  | 13.5 | (5.2-31.1) |  | 4.1 | (1.2-13.3) |  |
| Newar | 73 | 24.0 | 4.63 | (23.0-24.9) | 14.7 | (11.8-18.2) |  | 43.8 | (32.2-56.2) |  | 28.9 | (20.7-38.9) |  | 12.5 | (7.3-20.5) |  |
| Hill Janajati | 494 | 23.3 | 3.74 | (22.9-23.7) | 7.3 | (4.8-10.9) |  | 61.3 | (56.5-65.9) |  | 26.6 | (22.9-30.8) |  | 4.8 | (3.3-6.9) |  |
| Terai Janajati | 198 | 21.7 | 4.00 | (21.0-22.5) | 17.4 | (11.6-25.2) |  | 67.9 | (60.9-74.2) |  | 11.7 | (7.4-18.1) |  | 3.0 | (1.0-8.9) |  |
| Muslim | 37 | (21.3) | (3.14) | (20.0-22.5) | (14.5) | (4.7-36.7) |  | (73.7) | (54.4-86.8) |  | (11.8) | (3.6-32.6) |  | (0.0) | - |  |
| Total | 2,139 | 22.4 | 4.01 | (22.1-22.6) | 14.5 | (12.9-16.2) |  | 62.4 | (60.2-64.6) |  | 18.5 | (16.4-20.8) |  | 4.6 | (3.7-5.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CI-Confidence Interval |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ BMI is expressed as the ratio of weight in kilograms to the square of height in meters $\left(\mathrm{Kg} / \mathrm{m}^{2}\right)$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {C }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## CHAPTER11

## Anemia, Iron Deficiency

 and Iron Deficiency
## Anemia Status

This chapter presents the status of anemia, iron deficiency and iron deficiency anemia among children 6-59 months, adolescent boys 10-19 years, adolescent girls 10-19 years and women of reproductive age 15-49 years. Anemia is characterized by low levels of hemoglobin (the protein in red blood cells responsible for carrying oxygen) in the blood. Hemoglobin concentration was collected from intravenous blood samples and analyzed using HemoCue ${ }^{\circledR} \mathrm{Hb}-301$ photometer. Raw hemoglobin concentrations were adjusted for altitude and smoking following the WHO guideline (WHO 2011). Ferritin is the WHO recommended indicator to assess iron status and low serum ferritin concentrations reflect depleted iron stores (WHO 2001). In order to assess iron status, serum ferritin concentration was estimated using venous blood samples collected from the populations groups. When data are not normally distributed, the geometric mean is presented in tables instead of the mean.

### 11.1 Mean Hemoglobin and Anemia among Children 6-59 Months

Table 11.1 shows the geometric mean hemoglobin levels and anemia prevalence among 1651 children aged 6-59 months. The geometric mean hemoglobin level was $11.8 \mathrm{~g} / \mathrm{dl}$. Overall, 19 percent of children 6-59 months had anemia (Figure 11.1) with 14 percent mild anemia and five percent moderate anemia. Only 2 children (one from Western and one from Far-western region) had severe anemia (data not shown). Anemia varied by ecological region, age, ethnic caste and deworming status in the six months prior to the survey. Among children in the Terai the prevalence was 23 percent, and it was 17 percent in the Mountain and 15 percent in the Hill.

Among the children less than one year of age, the prevalence was 42-43 percent and it ranged from 18 to seven percent among older children 24-59 months. Among the ethnic caste groups, anemia ranged from 40 percent among the Muslim group to 10 percent among the Hill Brahmin group. Children 6-59 months who consumed deworming medicine in the last 6 months prior to the survey were less likely to have anemia compared to children who had not (17 percent versus 30 percent). As with any anemia, moderate and mild anemia also showed similar patterns by age, ethnic caste and consumption of deworming medicine. Mild anemia prevalence was 25-29 percent and moderate anemia was 13-19 percent among children less than one year of age. Mild anemia was 24 percent among children in the Other Terai group and mild and moderate anemia were 21 percent and 17 percent among children in the Muslim caste group. Further, children who had not consumed deworming medicine had higher prevalence of mild and moderate anemia compared to children who had consumed deworming medicine (mild anemia: 12 percent versus 20 percent, moderate anemia: four percent versus 10 percent).

### 11.2 Geometric Mean Ferritin, Iron Deficiency and Iron Deficiency Anemia among Children 6-59 Months

Table 11.2 presents the information on the geometric mean ferritin level and the prevalence of iron deficiency and iron deficiency anemia among children 6-59 months. The ferritin concentration was available for 1651 children 6-59 months and the geometric mean ferritin was $19.3 \mu \mathrm{~g} / \mathrm{L}$. Among the total children, almost three in ten (28 percent) had iron deficiency and 11 percent had iron deficiency anemia (Figure 11.1). The prevalence of iron deficiency varied by ecological region, location, age of children, wealth quintile and ethnicity. Among children in the Terai the prevalence was 32 percent and it was 24 percent and 23 percent respectively in Mountain and Hill. Iron deficiency among children ranged from 27 percent in rural area to 34 percent in urban area. Among the children less than two years of age, it was 47 percent and ranged from 13-28 percent among children 24-59 months. By wealth quintile, iron deficiency among children ranged from 23 percent in the lowest and second lowest quintile groups to 2437 percent among middle to highest wealth group. Among all the ethnicity groups, Muslim had the highest prevalence of iron deficiency (57 percent) and Terai Janajati had the lowest prevalence of iron deficiency (16 percent). The prevalence of iron deficiency among children in the Terai Dalit and Other Terai caste group was 38 percent each.

The prevalence of iron deficiency anemia (IDA) varied by location, age of children, wealth quintile and ethnicity of the children. Among children in urban areas, the prevalence of IDA was 17 percent and it was 10 percent among children in rural areas. IDA ranged from 19-26 percent among children aged 6-23 months and ranged from two to nine percent among those 24-59 months. By wealth quintile, it ranged from seven percent in the fourth wealth quintile group to 14 percent each in the middle and highest groups. Thirty percent of children in the Muslim caste group suffered from IDA whereas six percent had IDA among children from the Terai Brahmin/Chhetri caste. Ferritin data in Table 11.2 are adjusted for inflammation. Annex Table 11.1 presents the unadjusted ferritin data.

### 11.3 Geometric Mean Hemoglobin and Anemia among Adolescent Boys 10-19 Years

Table 11.3 shows the geometric mean hemoglobin levels and anemia prevalence among 1023 adolescent boys 10-19 years. The geometric mean hemoglobin level among adolescent boys $10-19$ years was $13.8 \mathrm{~g} / \mathrm{dl}$. Around one in ten adolescent boys $10-19$ years ( 11 percent) had anemia (Figure 11.1) with nine percent mild anemia and two percent moderate anemia. There were no cases of severe anemia among adolescent boys 10-19 years. The prevalence of anemia among boys varied by ecological region, education and ethnicity. The proportion of boys having anemia was four percent in Mountain, eight percent in Hill and 14 percent in Terai. Thirteen percent of boys with a primary education suffered from anemia compared to less than one percent among SLC and above level of education group. By wealth quintile anemia ranged from four percent in the highest wealth group to 15 percent in the middle group. Twenty-seven percent of boys from Terai Janajati caste group had anemia and it ranged from three percent to 19 percent in other caste group.

Mild anemia among adolescent boys was four percent, six percent and 12 percent respectively in the Mountain, Hill and Terai. It ranged from five percent among 10-11 years' age groups to 13 percent among 14-15 years. By education, mild anemia ranged from less than one percent among SLC and above level of education to 11 percent in some secondary education group. Three percent of the adolescent boys in the highest wealth quintile group had mild anemia and it ranged from nine percent to 12 percent in the other wealth quintile groups. By ethnicity, 19 percent of boys in the Terai Janajati and Terai Brahmin/Chhetri caste groups each suffered from mild anemia. Adolescent boys younger than 14 years (three percent) and among Terai Janajati caste group (seven percent) had higher prevalence of moderate anemia than their respective counterparts.

### 11.4 Geometric Mean Ferritin, Iron Deficiency and Iron Deficiency Anemia among Adolescent Boys 10-19 Years

Table 11.4 presents the information on the geometric mean ferritin level and the prevalence of iron deficiency and iron deficiency anemia among adolescent boys 10-19 years. The ferritin concentration was available for 1012 boys and the geometric mean ferritin was $44.5 \mu \mathrm{~g} / \mathrm{L}$. Among adolescent boys, five percent had iron deficiency and one percent had iron deficiency anemia (Figure 11.1). The prevalence of iron deficiency varied by development region, age, education and ethnicity of adolescent boys. Iron deficiency ranged from one percent in the Eastern region to eight percent in the Western region. Prevalence of iron deficiency significantly decreases with increasing age and increasing education level of adolescent boys (nine percent among 10-11 years versus one percent among 18-19 years and seven percent among primary education group versus one percent among SLC and above level of education group). No other background characteristics were found to be associated with iron deficiency anemia among adolescent boys except level of education. Ferritin data in Table 11.4 are adjusted for inflammation. Annex Table 11.2 presents the unadjusted ferritin data.

### 11.5 Geometric Mean Hemoglobin and Anemia among Non-Pregnant Adolescent Girls 10-19 Years

Table 11.5 shows the geometric mean hemoglobin levels and anemia prevalence among 1845 non-pregnant adolescent girls 10-19 years. The geometric mean hemoglobin level among adolescent girls was $12.6 \mathrm{~g} / \mathrm{dl}$. Around two in ten adolescent girls ( 21 percent) had anemia (Figure 11.1) with 14 percent mild anemia and six percent moderate anemia. Two girls (one from Eastern and one from Mid-western region) had severe anemia (data not shown). Prevalence of anemia among adolescent girls varied by development region, ecological region, age and ethnicity. Anemia prevalence ranged from 15 percent in Western region to 25 percent in Eastern region. The prevalence of anemia was nine percent, 13 percent and 29 percent respectively in the Mountain, Hill and Terai. Prevalence of anemia ranged from 12 percent among 10-11 years to 26 percent among 16-17 years. By caste group, anemia ranged from 45 percent among girls in the Terai Janajati group to 11 percent in the Newar group.

Mild anemia varied by ecological zone, age of adolescents, and ethnicity. A total of six percent, 10 percent and 20 percent of girls suffered from mild anemia in Mountain, Hill and Terai respectively. Prevalence of mild anemia ranged from eight percent among 10-11 years to 17 percent among 16-17 years. By ethnicity, 34 percent of girls in the Terai Brahmin/Chhetri caste had mild anemia, the highest prevalence.

Moderate anemia varied by ecological region ranging from four percent in Hill and nine percent in the Mountains and Terai. Further, it ranged from four percent among girls in the 10-11 and 12-13 years' age group to nine percent among girls in the 16-17 years' age group. By caste group, moderate anemia was highest at 18 percent among the Terai Janajati adolescent girls.

### 11.6 Geometric Mean Ferritin, Iron Deficiency and Iron Deficiency Anemia among Non-Pregnant Adolescent Girls 10-19 Years

Table 11.6 presents the information on the geometric mean ferritin level and the prevalence of iron deficiency and iron deficiency anemia among non-pregnant adolescent girls 10-19 years. The ferritin concentration was available for 1840 girls and the geometric mean ferritin was 28.2 $\mu \mathrm{g} / \mathrm{L}$. Among adolescent girls, 18 percent had iron deficiency and seven percent had iron deficiency anemia (Figure 11.1). The prevalence of iron deficiency varied by development region, age of adolescents, education and wealth quintile. Iron deficiency ranged from 14 percent in the Eastern and Mid-western regions to 21 percent in the Central region. By age group, nine percent suffered from iron deficiency among girls 10-11 years while 25 percent did so among girls 16-17 years. By education group, iron deficiency was 12 percent among girls with a primary education, 19 percent among those with some secondary, and around 25 percent each among girls with no education and with a SLC and above level of education group. Iron deficiency ranged from 13 percent among girls in the fourth wealth quintile group to 24 percent among those from the highest quintile group.

Iron deficiency anemia among adolescent girls was five percent each in Mountain and Hill and nine percent in Terai. It ranged from two percent among the 10-11 years age group to 12 percent in the 16-17 years age group. IDA varied with education level ranging from four percent among
those in the primary educated group to 13 percent among those in the no education group. By wealth quintile, IDA ranged from five percent among the fourth quintile group to 11 percent among the highest wealth quintile group. The prevalence of IDA among adolescent girls from Terai Janajati caste group was the highest at 14 percent. Ferritin data in Table 11.6 are adjusted for inflammation. Annex Table 11.3 presents the unadjusted ferritin data.

### 11.7 Geometric Mean Hemoglobin and Anemia among Non-Pregnant Women 15-49 Years

Table 11.7 shows the geometric mean hemoglobin levels and anemia prevalence among 2,136 non-pregnant women 15-49 years of age. The geometric mean hemoglobin level among nonpregnant women 15-49 years was $12.8 \mathrm{~g} / \mathrm{dl}$. Two in ten non-pregnant women ( 20 percent) had anemia (Figure 11.1) with 13 percent mild anemia and seven percent moderate anemia. Seven non-pregnant women (one from the Eastern, 3 from the Central, 2 from the Western and one from the Far-western) had severe anemia (data not shown). Prevalence of anemia among nonpregnant women varied by development region, ecological region, wealth quintile and ethnicity. The proportion of anemia ranged from 17 percent in the Central and the Mid-western regions to 27 percent in the Eastern region. Eleven percent of non-pregnant women in the Mountain, 12 percent in Hill and 29 percent in the Terai suffered from anemia. By wealth quintile, 16 percent from the lowest group to 25 percent in the middle group had anemia. By caste group, 48 percent of non-pregnant women in the Terai Janajati caste suffered from anemia.

Prevalence of mild anemia among non-pregnant women varied by development region, ecological region, location, education, wealth quintile and ethnicity. By development region it ranged from 10 percent in the Central region to 20 percent in the Eastern region. Eight percent of non-pregnant women in the Mountain and Hill regions and 18 percent in the Terai had mild anemia. By education, mild anemia ranged from 10 percent among those in the SLC and above level of education group to 16 percent among those with a secondary education level. A total of 10 percent women in the lowest wealth quintile suffered from anemia while it ranged up to 16 percent among those in the middle wealth quintile group. Mild anemia by caste group ranged from one percent among the Newar to 35 percent in the Terai Janajati group.

Three percent of non-pregnant women in the Mountain and Hill regions and 10 percent in the Terai suffered from moderate anemia. Compared to women who were lactating, women who were not lactating had a higher prevalence of moderate anemia (five percent versus 10 percent). By education, percentage of women having moderate anemia ranged from four percent among women with some secondary education to nine percent among women with a primary education. The highest prevalence of moderate anemia was 16 percent among non-pregnant women in the Muslim caste group.

### 11.8 Geometric Mean Ferritin, Iron Deficiency and Iron Deficiency Anemia among Non-Pregnant Women 15-49 Years

Table 11.8 presents the information on the geometric mean ferritin level and the prevalence of iron deficiency and iron deficiency anemia among non-pregnant women 15-49 years. The ferritin concentration was available for 2,129 non-pregnant women and the geometric mean ferritin was $29.9 \mu \mathrm{~g} / \mathrm{L}$. Among non-pregnant women, 19 percent had iron deficiency and eight percent had iron deficiency anemia (Figure 11.1). The prevalence of iron deficiency varied by development region ranging from 14 percent in the Mid-western region to 23 percent in the Western region. Iron deficiency among women varied by lactation status, level of education, wealth quintile and ethnicity. Compared to women who were lactating, a higher proportion of non-lactating women suffered from iron deficiency (14 percent versus 22 percent). Iron deficiency among women increases with increasing level of education ( 15 percent among no education group versus 24 percent among SLC and above level of education group). By wealth quintile, it varied from 15 percent among the lowest group to 24 percent among the highest wealth group. Among women in the Hill Brahmin caste group, 27 percent suffered from iron deficiency.

Iron deficiency anemia among non-pregnant women was five percent in the Mountain, six percent in Hill and 10 percent in the Terai. The proportion of lactating women suffered from IDA was six percent and the proportion of non-lactating women suffered from IDA was 11 percent. By education, IDA among women varied from six percent among those with some secondary education to 10 percent each among those with a primary level and among those with a SLC and above level of education. Ferritin data in Table 11.8 are adjusted for inflammation. Annex Table 11.4 presents the unadjusted ferritin data.

### 11.9 Geometric Mean Hemoglobin and Anemia among Pregnant Women 15-49 Years

Table 11.9 shows the geometric mean hemoglobin levels and anemia prevalence among 204 pregnant women 15-49 years. The geometric mean hemoglobin level among pregnant women was $11.5 \mathrm{~g} / \mathrm{dl}$. Almost three in ten pregnant women ( 27 percent) had anemia (Figure 11.1) with 17 percent mild anemia and 10 percent moderate anemia. No pregnant women had severe anemia. A higher proportion of pregnant women 15-49 years in the Terai had any anemia or mild anemia ( 36 percent any anemia and 23 percent mild anemia). Age of pregnant women was associated with any anemia ( 20 percent among age 15-19 years versus 55 percent among age 30-49 years) or mild anemia (17 percent among age 15-19 years versus 33 percent among age 30-49 years). Further, pregnant women who had consumed deworming medication in the past 6 months prior to the survey had a lower prevalence of any anemia and moderate anemia compared to pregnant women who had not consumed the deworming medications (any anemia: 19 percent versus 34 percent and moderate anemia five percent versus 14 percent). Any anemia or mild anemia did not vary by trimester of pregnancy; it did vary by moderate anemia and was 17 percent among women in their third trimester, three percent in the first and seven percent in the second trimester.

### 11.10 Geometric Mean Ferritin, Iron Deficiency and Iron Deficiency Anemia among Pregnant Women 15-49 Years

Table 11.10 presents the information on the geometric mean ferritin level and the prevalence of iron deficiency and iron deficiency anemia among pregnant women 15-49 years. The ferritin concentration was available for 201 pregnant women and the geometric mean ferritin was 28.5 $\mu \mathrm{g} / \mathrm{L}$. Among pregnant women, 14 percent had iron deficiency and five percent had iron deficiency anemia (Figure 11.1). Ferritin data in Table 11.10 are adjusted for inflammation. Annex Table 11.5 presents the unadjusted ferritin data.

Figure 11.1: Prevalence of Anemia, Iron Deficiency and Iron Deficiency Anemia among Target Groups, Nepal National Micronutrient Status Survey, 2016


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Table 11.10: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Pregnant Women 15-49 Years

| Characteristics | N | Mean Hemoglobin |  | Any Anemia $11.0 \mathrm{~g} / \mathrm{dL}$ |  |  | Mild Anemia (10.0-10.9 g/dL) |  |  | Moderate Anemia(7.0-9.9 g/dL) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 324 | 11.8 | 1.1 | 17.5 | (13.4-22.6) |  | 13.1 | (10.2-16.6) |  | 4.4 | (2.4-8.0) |  |
| Central | 343 | 11.7 | 1.1 | 21.4 | (15.2-29.2) | 0.301 | 15.7 | (10.7-22.4) |  | 5.6 | (3.4-9.2) |  |
| Western | 280 | 11.9 | 1.1 | 17.3 | (12.9-22.9) | 0.301 | 12.5 | (9.1-16.9) | 0.420 | 4.5 | (2.7-7.6) | 0.825 |
| Mid-western | 341 | 11.8 | 1.1 | 16.4 | (13.1-20.3) |  | 11.1 | (8.5-14.4) |  | 5.3 | (3.9-7.1) |  |
| Far-western | 363 | 11.7 | 1.1 | 21.0 | (14.9-28.7) |  | 13.9 | (10.0-19.1) |  | 6.8 | (4.1-11.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 268 | 11.9 | 1.1 | 16.5 | (10.4-25.2) | <0.001 | 11.0 | (7.1-16.5) |  | 5.2 | (3.0-8.8) |  |
| Hill | 687 | 12.0 | 1.1 | 14.8 | (12.9-17.0) | <0.001 | 10.7 | (9.3-12.3) | 0.002 | 4.1 | (3.3-5.2) | 0.175 |
| Terai | 696 | 11.6 | 1.1 | 23.0 | (17.9-28.9) |  | 16.7 | (12.6-21.7) |  | 6.2 | (4.1-9.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 211 | 11.8 | 1.1 | 22.6 | (13.5-35.3) | 0.181 | 16.6 | (11.6-23.2) | 0.181 | 6.0 | (2.3-14.6) | 0.514 |
| Rural | 1,440 | 11.8 | 1.1 | 18.6 | (15.6-22.0) |  | 13.3 | (10.9-16.2) | 0.181 | 5.1 | (3.8-6.9) | 0.514 |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-8 | 66 | 11.0 | 1.1 | 42.0 | (27.7-57.8) |  | 29.1 | (17.0-45.1) |  | 12.9 | (6.7-23.3) |  |
| 9-11 | 83 | 11.1 | 1.1 | 43.4 | (32.9-54.5) |  | 24.7 | (15.7-36.5) |  | 18.7 | (12.2-27.8) |  |
| 12-17 | 170 | 11.4 | 1.1 | 34.1 | (25.6-43.6) |  | 24.8 | (17.2-34.4) |  | 9.3 | (5.4-15.5) |  |
| 18-23 | 157 | 11.5 | 1.1 | 23.1 | (16.6-31.1) | $<0.001$ | 14.5 | (9.9-20.9) | $<0.001$ | 8.3 | (5.1-13.1) | $<0.001$ |
| 24-35 | 384 | 11.8 | 1.1 | 17.5 | (13.8-22.1) |  | 12.5 | (9.7-16.1) |  | 4.8 | (3.1-7.3) |  |
| 36-47 | 404 | 12.0 | 1.1 | 15.2 | (9.9-22.6) |  | 13.6 | (8.5-21.3) |  | 1.5 | (0.7-3.4) |  |
| 48-59 | 387 | 12.2 | 1.1 | 7.1 | (4.7-10.6) |  | 4.8 | (2.8-7.8) |  | 2.4 | (1.0-5.5) |  |
| 6-23 | 476 | 11.3 | 1.1 | 33.0 | (28.2-38.1) |  | 21.9 | (18.1-26.3) |  | 11.0 | (8.1-14.7) |  |
| 24-59 | 1,175 | 12.0 | 1.1 | 13.2 | (10.2-16.9) | <0.001 | 10.3 | (7.7-13.7) | <0.001 | 2.8 | (2.0-4.0) | <0.001 |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 836 | 11.8 | 1.1 | 19.6 | (16.1-23.6) | 0.553 | 14.2 | (11.2-17.9) | 0.544 | 5.3 | (3.6-7.8) | 0.888 |
| Female | 815 | 11.8 | 1.1 | 18.5 | (15.6-21.7) |  | 13.2 | (10.4-16.6) | 0.544 | 5.2 | (3.5-7.6) | 0.888 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 222 | 11.8 | 1.1 | 19.2 | (11.0-31.3) |  | 14.1 | (9.8-19.9) |  | 5.1 | (1.7-14.8) |  |
| Primary ${ }^{\text {c }}$ | 169 | 11.8 | 1.1 | 18.8 | (13.4-25.7) | 0.178 | 11.8 | (7.7-17.7) | 0.635 | 6.3 | (3.7-10.5) | 0.095 |
| Some secondary ${ }^{\text {d }}$ | 239 | 12.0 | 1.1 | 12.5 | (8.5-18.1) |  | 10.9 | (7.0-16.6) | 0.635 | 1.6 | (1.1-2.4) | 0.095 |
| SLC and above ${ }^{\text {e }}$ | 223 | 11.9 | 1.1 | 18.2 | (13.2-24.5) |  | 14.4 | (10.1-20.1) |  | 3.8 | (2.1-6.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 463 | 11.7 | 1.1 | 17.7 | (13.7-22.5) |  | 10.3 | (8.2-12.9) |  | 7.2 | (4.4-11.7) |  |
| Second | 342 | 11.8 | 1.1 | 18.1 | (13.1-24.3) | 0.270 | 14.5 | (10.2-20.2) |  | 3.5 | (2.2-5.6) |  |
| Middle | 294 | 11.8 | 1.1 | 23.6 | (17.6-31.0) | 0.270 | 18.7 | (12.7-26.6) | 0.029 | 5.0 | (2.9-8.4) | 0.237 |
| Fourth | 301 | 11.8 | 1.1 | 18.4 | (12.9-25.6) |  | 12.5 | (8.3-18.4) |  | 5.7 | (3.0-10.6) |  |
| Highest | 251 | 12.0 | 1.1 | 17.7 | (12.4-24.7) |  | 13.1 | (8.7-19.3) |  | 4.6 | (3.0-7.0) |  |

Table 11.1: Cont'd.

| Characteristics | N | Mean Hemoglobin |  | Any Anemia $<11.0 \mathrm{~g} / \mathrm{dL}$ |  |  | Mild Anemia (10.0-10.9 g/dL) |  |  | Moderate Anemia(7.0-9.9 g/dL) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 150 | 12.1 | 1.1 | 10.2 | (6.7-15.3) |  | 6.2 | (3.4-10.9) |  | 4.1 | (1.9-8.4) |  |
| Hill Chhetri | 387 | 12.0 | 1.1 | 15.8 | (12.9-19.3) |  | 11.9 | (9.6-14.7) |  | 3.9 | (2.4-6.1) |  |
| Terai Brahmin/ Chhetri | 41 | (11.7) | (1.1) | (17.0) | (6.3-38.3) |  | (11.0) | (5.1-22.2) |  | (6.0) | (1.3-24.3) |  |
| Other Terai caste | 132 | 11.5 | 1.1 | 31.7 | (20.3-45.9) |  | 23.7 | (15.5-34.6) |  | 8.0 | (2.9-19.9) |  |
| Hill Dalit | 263 | 11.8 | 1.1 | 16.2 | (11.6-22.1) | <0.001 | 8.3 | (5.3-12.8) | <0.001 | 7.7 | (5.2-11.1) | <0.001 |
| Terai Dalit | 85 | 11.7 | 1.1 | 19.3 | (8.0-39.9) |  | 19.3 | (8.0-39.9) | <0.001 | - | - |  |
| Newar | 50 | 12.2 | 1.1 | 15.1 | (7.0-29.5) |  | 11.4 | (4.9-24.4) |  | 3.7 | (0.5-23.1) |  |
| Hill Janajati | 377 | 11.9 | 1.1 | 14.6 | (12.0-17.6) |  | 12.1 | (10.0-14.6) |  | 2.5 | (1.5-3.9) |  |
| Terai Janajati | 116 | 11.5 | 1.1 | 24.9 | (17.2-34.7) |  | 15.0 | (9.9-22.0) |  | 10.0 | (5.2-18.2) |  |
| Muslim | 48 | (10.9) | (1.2) | (39.7) | (18.2-66.1) |  | (20.8) | (11.4-34.9) |  | (17.3) | (5.3-44.0) |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Vita micronutrient powder intake during 7 days prior to survey |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 37 | (12.0) | (1.1) | (7.0) | (2.9-16.2) | 0.086 | (5.4) | (1.9-14.0) |  | (1.7) | (0.2-10.9) |  |
| No | 1,614 | 11.8 | 1.1 | 19.3 | (16.4-22.7) |  | 13.9 | (11.6-16.7) |  | 5.3 | (4.1-6.9) | 0.498 |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 294 | 11.9 | 1.1 | 16.0 | (10.7-23.1) | 0.141 | 9.9 | (5.4-17.4) | 0.042 | 6.1 | (3.4-10.6) | 0.562 |
| Negative | 1,189 | 11.8 | 1.1 | 19.9 | (16.8-23.5) |  | 14.5 | (11.9-17.5) | 0.042 | 5.3 | (3.9-7.2) | 0.562 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 1,358 | 11.9 | 1.1 | 16.5 | (13.2-20.4) |  | 12.2 | (9.6-15.4) |  | 4.1 | (2.9-6.0) |  |
| No | 284 | 11.5 | 1.1 | 30.3 | (24.0-37.6) | $<0.001$ | 20.0 | (15.3-25.8) | $<0.001$ | 10.3 | (6.8-15.3) | <0.001 |
| Don't know | 8 | * | * | * | * |  | * | * |  | * | * |  |
| Total | 1,651 | 11.8 | 1.1 | 19.1 | (16.2-22.3) |  | 13.7 | (11.4-16.4) |  | 5.3 | (4.1-6.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Hemoglobin concentrations are adjusted for altitude. WHO 2011. |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |

Table 11.2: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}, \mathrm{c}}$ |  | Iron deficiencyFerritin $<12.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  | Iron deficiency anemia Hemoglobin Children $<11.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{d}}$ and Ferritin $<12.0 \mu \mathrm{~g} / \mathrm{L}^{\text {a, b. c }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 323 | 22.3 | 2.2 | 22.9 | (17.4-29.6) |  | 8.2 | (5.0-13.2) |  |
| Central | 346 | 18.3 | 2.4 | 30.1 | (25.9-34.6) |  | 12.7 | (8.8-18.2) |  |
| Western | 277 | 17.9 | 2.2 | 27.9 | (21.8-35.0) | 0.182 | 9.7 | (6.7-13.8) | 0.249 |
| Mid-western | 339 | 19.4 | 2.3 | 28.7 | (23.9-34.1) |  | 9.8 | (7.0-13.6) |  |
| Far-western | 366 | 19.5 | 2.3 | 25.8 | (21.1-31.2) |  | 10.5 | (6.7-16.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 268 | 21.7 | 2.4 | 23.6 | (18.6-29.5) |  | 9.8 | (5.4-17.0) |  |
| Hill | 685 | 21.1 | 2.2 | 22.5 | (19.8-25.4) | <0.001 | 8.7 | (7.1-10.7) | 0.084 |
| Terai | 698 | 17.6 | 2.4 | 32.3 | (28.0-36.9) |  | 12.3 | (8.9-16.7) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 211 | 16.4 | 2.3 | 34.0 | (24.3-45.3) | 0.026 | 16.9 | (9.9-27.2) | 0.002 |
| Rural | 1,440 | 19.8 | 2.3 | 26.6 | (23.8-29.6) |  | 9.7 | (7.7-12.1) |  |
| Age, months |  |  |  |  |  |  |  |  |  |
| 6-8 | 65 | 17.9 | 2.5 | 34.6 | (23.7-47.3) |  | 19.6 | (12.0-30.5) |  |
| 9-11 | 84 | 13.5 | 2.3 | 45.0 | (34.1-56.5) |  | 26.4 | (18.5-36.2) |  |
| 12-17 | 171 | 12.2 | 2.2 | 47.5 | (40.4-55.1) |  | 25.2 | (17.8-34.4) |  |
| 18-23 | 157 | 12.2 | 2.4 | 51.2 | (44.5-57.8) | <0.001 | 18.5 | (13.3-25.2) | <0.001 |
| 24-35 | 384 | 18.7 | 2.3 | 27.5 | (22.4-33.3) |  | 9.0 | (6.3-12.7) |  |
| 36-47 | 403 | 23.4 | 2.1 | 18.4 | (13.9-24.0) |  | 5.9 | (2.8-12.0) |  |
| 48-59 | 387 | 26.8 | 2.0 | 12.9 | (9.1-18.0) |  | 2.2 | (0.9-5.1) |  |
| 6-23 | 477 | 13.1 | 2.3 | 46.6 | (42.3-51.0) | <0.001 | 22.4 | (18.5-26.8) | <0.001 |
| 24-59 | 1,174 | 22.8 | 2.2 | 19.5 | (16.7-22.6) | <0.001 | 5.6 | (3.9-8.1) | <0.001 |
| Sex |  |  |  |  |  |  |  |  |  |
| Male | 838 | 19.0 | 2.3 | 28.4 | (25.1-31.9) | . 418 | 10.8 | (8.5-13.6) | 73 |
| Female | 813 | 19.6 | 2.3 | 26.6 | (23.3-30.2) |  | 10.4 | (8.2-13.1) | . 73 |
| Maternal Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 222 | 18.3 | 2.3 | 28.8 | (20.2-39.1) |  | 11.3 | (5.8-20.8) |  |
| Primary ${ }^{\text {f }}$ | 170 | 20.6 | 2.5 | 22.7 | (16.2-30.7) |  | 9.0 | (5.6-14.1) | 0.396 |
| Some secondary ${ }^{\text {g }}$ | 238 | 21.6 | 2.2 | 22.7 | (18.2-28.0) | 0.192 | 8.9 | (5.4-14.4) | 0.396 |
| SLC and above ${ }^{\text {h }}$ | 220 | 17.7 | 2.3 | 29.6 | (21.6-39.1) |  | 13.5 | (9.4-19.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 462 | 21.8 | 2.3 | 23.3 | (19.0-28.3) |  | 10.8 | (8.0-14.5) |  |
| Second | 342 | 20.7 | 2.3 | 23.1 | (18.7-28.2) |  | 7.8 | (4.3-13.6) |  |
| Middle | 292 | 16.5 | 2.4 | 36.6 | (28.2-45.9) | <0.001 | 14.2 | (10.1-19.6) | 0.004 |
| Fourth | 304 | 20.3 | 2.3 | 24.3 | (18.5-31.2) |  | 6.7 | (4.4-10.1) |  |
| Highest | 251 | 17.4 | 2.2 | 31.1 | (24.3-38.9) |  | 13.7 | (9.1-20.2) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 149 | 16.4 | 2.2 | 35.7 | (26.9-45.7) |  | 7.1 | (4.3-11.5) |  |
| Hill Chhetri | 388 | 19.1 | 2.1 | 25.6 | (21.1-30.7) |  | 8.3 | (5.8-11.6) |  |
| Terai Brahmin/Chhetri | 42 | (18.1) | (2.2) | (29.7) | (11.4-58.1) |  | (6.4) | (1.5-23.7) |  |
| Other Terai caste | 131 | 14.5 | 2.3 | 38.3 | (31.4-45.7) |  | 19.3 | (10.3-33.4) |  |
| Hill Dalit | 263 | 19.9 | 2.2 | 23.4 | (18.0-29.9) | <0.001 | 9.8 | (6.7-14.1) | <0.001 |
| Terai Dalit | 85 | 18.9 | 2.5 | 38.1 | (28.2-49.2) |  | 11.3 | (4.8-24.3) |  |
| Newar | 50 | 22.5 | 2.5 | 17.2 | (9.0-30.5) |  | 9.0 | (3.0-24.0) |  |
| Hill Janajati | 375 | 24.8 | 2.1 | 17.4 | (13.6-22.0) |  | 7.3 | (5.7-9.4) |  |
| Terai Janajati | 117 | 24.6 | 2.2 | 15.8 | (10.1-24.0) |  | 6.7 | (3.2-13.8) |  |
| Muslim | 49 | (11.3) | (2.4) | (57.4) | (46.9-67.3) |  | (29.7) | (15.3-49.9) |  |
| Any iron supplementation or |  |  |  |  |  |  |  |  |  |
| Baal Vita micronutrient powder intake during 7 days prior to survey |  |  |  |  |  |  |  |  |  |
| Yes | 35 | (23.9) | (2.2) | (21.6) | (14.6-30.7) | 0.359 | (4.4) | (1.4-13.4) | 0.342 |
| No | 1,616 | 19.2 | 2.3 | 27.7 | (25.1-30.4) | 0.359 | 10.7 | (8.7-13.1) | 0.342 |
| Total | 1,651 | 19.3 | 2.3 | 27.6 | (25.0-30.2) |  | 10.6 | (8.7-12.9) |  |

[^35]Table 11.3: Anemia Prevalence in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean Hemoglobin ${ }^{\text {a }}$ |  | Any Anemia ${ }^{\text {a,b }}$ |  |  | Mild Anemia ${ }^{\text {a,c }}$ |  |  | Moderate Anemia ${ }^{\text {a,d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 208 | 13.8 | 1.1 | 10.3 | (5.4-19.0) |  | 8.6 | (5.4-13.6) |  | 1.7 | (0.3-10.6) |  |
| Central | 209 | 13.8 | 1.1 | 11.3 | (7.8-16.3) |  | 10.1 | (6.9-14.6) |  | 1.2 | (0.3-5.0) |  |
| Western | 195 | 13.9 | 1.1 | 8.7 | (5.5-13.7) | 0.808 | 7.3 | (4.8-11.0) | 0.727 | 1.4 | (0.3-5.9) | 0.866 |
| Mid-western | 199 | 13.9 | 1.1 | 9.2 | (6.0-13.8) |  | 7.4 | (5.0-10.9) |  | 1.8 | (0.7-4.8) |  |
| Far-western | 212 | 13.5 | 1.1 | 12.6 | (8.4-18.4) |  | 10.3 | (7.0-15.1) |  | 2.3 | (0.7-6.6) |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 157 | 14.1 | 1.1 | 3.6 | (1.7-7.6) |  | 3.6 | (1.7-7.6) |  | 0.0 | - |  |
| Hill | 434 | 14.1 | 1.1 | 7.5 | (6.0-9.3) | 0.001 | 6.1 | (5.0-7.4) | 0.003 | 1.4 | (0.5-3.5) | 0.455 |
| Terai | 432 | 13.5 | 1.1 | 13.8 | (10.2-18.5) |  | 11.9 | (9.1-15.4) |  | 1.9 | (0.7-4.9) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 142 | 14.1 | 1.1 | 6.4 | (3.2-12.4) | 0.089 | 6.0 | (2.9-11.7) | 0.149 | 0.5 | (0.1-3.4) | 0.375 |
| Rural | 881 | 13.7 | 1.1 | 11.1 | (8.7-14.0) | 0.089 | 9.4 | (7.5-11.7) | 0.149 | 1.7 | (0.8-3.5) | 0.375 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 207 | 12.8 | 1.1 | 7.5 | (4.4-12.4) |  | 4.7 | (2.4-9.0) |  | 2.8 | (1.2-6.6) |  |
| 12-13 | 264 | 13.2 | 1.1 | 12.2 | (7.8-18.5) |  | 8.8 | (5.5-13.8) |  | 3.4 | (1.1-10.0) |  |
| 14-15 | 237 | 13.8 | 1.1 | 13.5 | (10.0-18.0) | 0.182 | 13.4 | (9.9-17.8) | 0.021 | 0.1 | (0.0-1.0) | 0.003 |
| 16-17 | 165 | 14.7 | 1.1 | 10.3 | (5.2-19.3) |  | 10.3 | (5.2-19.3) |  | 0.0 | - |  |
| 18-19 | 150 | 15.1 | 1.1 | 7.6 | (3.6-15.4) |  | 7.0 | (3.2-14.7) |  | 0.6 | (0.1-4.6) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {f }}$ | 7 | * | * | * | * |  | * | * |  | * | * |  |
| Primary ${ }^{\text {g }}$ | 320 | 13.0 | 1.1 | 12.8 | (9.0-18.0) | <0.001 | 9.2 | (6.0-13.7) | <0.001 | 3.7 | $(1.6-8.3)$ | 0.001 |
| Some secondary ${ }^{\text {h }}$ | 552 | 13.9 | 1.1 | 12.0 | (9.5-14.9) | <0.001 | 11.2 | (8.8-14.1) | <0.001 | 0.8 | (0.3-2.0) | 0.001 |
| SLC and above ${ }^{\text {i }}$ | 144 | 15.4 | 1.1 | 0.4 | (0.1-2.8) |  | 0.4 | (0.1-2.8) |  | 0.0 | (0.3-2.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 251 | 13.5 | 1.1 | 12.4 | (9.2-16.6) |  | 11.3 | (8.1-15.5) |  | 1.1 | (0.3-4.0) |  |
| Second | 211 | 13.8 | 1.1 | 9.0 | (5.5-14.3) |  | 8.8 | (5.4-14.1) |  | 0.2 | (0.0-1.4) |  |
| Middle | 209 | 13.5 | 1.1 | 15.2 | (9.2-24.2) | 0.004 | 11.5 | (7.4-17.5) | 0.007 | 3.7 | (1.3-10.3) | 0.038 |
| Fourth | 165 | 13.7 | 1.1 | 11.5 | (6.9-18.6) |  | 10.6 | (6.3-17.3) |  | 1.0 | (0.2-4.0) |  |
| Highest | 187 | 14.3 | 1.1 | 4.4 | (2.1-8.7) |  | 2.8 | (1.2-6.7) |  | 1.5 | (0.4-5.7) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 137 | 14.0 | 1.1 | 6.3 | (3.5-11.3) |  | 4.8 | (2.4-9.3) |  | 1.5 | (0.2-9.1) |  |
| Hill Chhetri | 266 | 14.1 | 1.1 | 6.7 | (4.2-10.5) |  | 6.0 | (3.7-9.8) |  | 0.6 | (0.2-1.9) |  |
| Terai Brahmin/ Chhetri | 31 | (13.8) | (1.1) | (18.8) | (9.2-34.7) |  | (18.8) | (9.2-34.7) |  | (0.0) | - |  |
| Other Terai caste | 70 | 13.0 | 1.1 | 14.8 | (7.7-26.7) |  | 12.4 | (6.3-22.7) |  | 2.5 | (0.6-10.1) | <0.001 |
| Hill Dalit | 121 | 14.1 | 1.1 | 5.2 | (2.3-11.4) | $<0.001$ | 3.6 | (1.6-8.1) | $<0.001$ | 1.6 | (0.4-6.2) |  |
| Terai Dalit | 38 | (13.9) | 1.1 | (9.7) | (3.2-25.8) |  | (9.7) | (3.2-25.8) |  | (0.0) | - |  |
| Newar | 37 | (14.8) | 1.1 | (3.4) | (0.4-22.2) |  | (0.0) | - |  | (3.4) | (0.4-22.2) |  |
| Hill Janajati | 211 | 13.9 | 1.1 | 9.6 | (7.2-12.7) |  | 9.6 | (7.2-12.7) |  | 0.0 | (0.4-22.2) |  |
| Terai Janajati | 90 | 13.0 | 1.1 | 26.6 | (14.7-43.2) |  | 19.3 | (12.1-29.4) |  | 7.3 | (2.5-19.4) |  |
| Muslim | 22 | * | * | * | * |  | * | * |  | * | * |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 13 | * | * | * | * |  | * | * |  | * | * |  |
| No | 1,010 | 13.8 | 1.1 | 10.5 | (8.4-13.1) | - | 8.9 | (7.3-10.9) |  | 1.6 | (0.8-3.1) | - |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 156 | 13.8 | 1.1 | 10.3 | (5.7-17.8) | 0.879 | 10.3 | (5.7-17.8) | 0.595 | 0.0 | - |  |
| Negative | 867 | 13.8 | 1.1 | 10.5 | (8.3-13.2) | 0.879 | 8.7 | (7.0-10.6) | 0.595 | 1.8 | (0.9-3.6) |  |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 628 | 13.6 | 1.1 | 10.9 | (8.6-13.8) | 0.539 | 9.9 | (7.7-12.6) | 0.220 | 1.1 | (0.5-2.3) | 0.203 |
| No | 395 | 14.0 | 1.1 | 9.9 | (6.5-14.7) | 0.539 | 7.8 | (5.4-11.0) | 0.220 | 2.1 | (0.8-5.7) | 0.203 |
| Total | 1,023 | 13.8 | 1.1 | 10.5 | (8.3-13.0) |  | 8.9 | (7.3-10.8) |  | 1.6 | (0.8-3.1) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Hemoglobin concentrations are adjusted for altitude and smoking. WHO 2011.
${ }^{\mathrm{b}}$ Any anemia defined as children $5-11 \mathrm{y}<11.5 \mathrm{~g} / \mathrm{dL}$, children $12-14 \mathrm{y}<12.0 \mathrm{~g} / \mathrm{dL}$ \& men $15-49 \mathrm{y}<13.0 \mathrm{~g} / \mathrm{dL}$.
${ }^{\text {c }}$ Mild anemia defined as children $10-11$ y 11.0-11.4 g/dL, children $12-14$ y 11.0-11.9 g/dL, \& men 15-19 y 11.0-12.9 g/dL
${ }^{\mathrm{d}}$ Moderate anemia defined as hemoglobin 8.0-10.9 $\mathrm{g} / \mathrm{dL}$
${ }^{\text {e }}$ Severe anemia defined as hemoglobin $<8.0 \mathrm{~g} / \mathrm{Dl}$
${ }^{\text {f }}$ Includes those who have never attended school.
${ }^{\text {g Includes those who have completed 0-5 years of school. }}$
${ }^{\text {h }}$ Includes those who have completed 6-9 years of school.
iIncludes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Table 11.4: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}, \mathrm{c}}$ |  | Iron deficiency Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  | Iron deficiency anemia Hemoglobin Children 5-11 y $<11.5 \mathrm{~g} / \mathrm{dL}$, Children 12-14 y $<12.0 \mathrm{~g} / \mathrm{dL}$ and Men $\geq 15 \mathrm{y}<13.0$ $\mathrm{g} / \mathrm{dL}^{\mathrm{d}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 207 | 50.6 | 1.7 | 1.1 | (0.3-3.5) |  | 0.2 | (0.0-1.8) |  |
| Central | 206 | 42.4 | 1.9 | 7.1 | (5.0-10.1) | 0.004 | 0.8 | (0.1-5.4) | 0.791 |
| Western | 193 | 40.0 | 1.8 | 7.5 | (4.8-11.8) | 0.004 | 1.5 | (0.4-6.2) | 0.791 |
| Mid-western | 196 | 47.7 | 1.7 | 3.0 | (1.2-7.5) |  | 1.6 | (0.4-6.6) |  |
| Far-western | 210 | 44.4 | 1.7 | 2.7 | (1.1-6.5) |  | 0.6 | (0.1-4.2) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 154 | 44.1 | 1.7 | 3.3 | (1.1-9.0) | 0.705 | 0.0 | - | 0.718 |
| Hill | 430 | 42.6 | 1.8 | 5.2 | (3.9-6.8) | 0.705 | 0.9 | (0.2-3.0) | 0.718 |
| Terai | 428 | 46.2 | 1.8 | 4.7 | (3.1-7.1) |  | 1.0 | (0.3-3.2) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 140 | 49.7 | 1.8 | 3.0 | (1.6-5.8) | . 260 | 0.0 | - |  |
| Rural | 872 | 43.8 | 1.8 | 5.1 | (3.8-6.7) | 0.260 | 1.0 | (0.4-2.4) |  |
| Age, years |  |  |  |  |  |  |  |  |  |
| 10-11 | 202 | 40.6 | 1.9 | 8.5 | (5.6-12.6) |  | 0.9 | (0.1-6.0) |  |
| 12-13 | 263 | 40.8 | 1.8 | 4.8 | (2.1-10.3) |  | 1.5 | (0.4-6.4) |  |
| 14-15 | 234 | 40.1 | 1.7 | 5.3 | (3.1-9.1) | 0.009 | 1.2 | (0.3-4.6) | 0.537 |
| 16-17 | 165 | 45.7 | 1.7 | 3.5 | (1.5-8.1) |  | 0.4 | (0.1-2.9) |  |
| 18-19 | 148 | 64.3 | 1.7 | 0.7 | (0.1-5.2) |  | 0.0 | - |  |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 7 | * | * | * | * |  | * | * |  |
| Primary ${ }^{\text {f }}$ | 318 | 41.5 | 1.9 | 7.0 | (4.9-9.9) | 0.008 | 2.2 | (0.8-5.7) | 0.013 |
| Some secondary ${ }^{\text {g }}$ | 544 | 44.0 | 1.8 | 4.6 | (2.6-7.9) |  | 0.4 | (0.1-1.5) | 0.013 |
| SLC and above ${ }^{\text {h }}$ | 143 | 55.5 | 1.7 | 0.6 | (0.1-4.3) |  | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 248 | 42.7 | 1.7 | 4.8 | (3.4-6.9) |  | 0.0 | - |  |
| Second | 206 | 37.6 | 1.8 | 7.1 | (4.6-10.8) |  | 0.3 | (0.0-2.3) |  |
| Middle | 209 | 47.5 | 1.8 | 4.7 | (2.1-10.4) | 0.554 | 2.0 | (0.5-6.7) | 0.386 |
| Fourth | 163 | 50.5 | 1.8 | 3.4 | (1.5-7.6) |  | 1.2 | (0.3-5.1) |  |
| Highest | 186 | 45.6 | 1.9 | 3.9 | (2.0-7.2) |  | 0.8 | (0.1-5.5) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 135 | 34.8 | 1.8 | 7.4 | (3.3-15.5) |  | 1.5 | (0.2-9.2) |  |
| Hill Chhetri | 266 | 41.4 | 1.7 | 2.7 | (1.4-4.9) |  | 0.6 | (0.1-4.2) |  |
| Terai Brahmin/Chhetri | 31 | (53.6) | (1.8) | (2.9) | (0.6-13.6) |  | (0.0) | - |  |
| Other Terai caste | 70 | 43.3 | 1.9 | 9.8 | (5.0-18.3) |  | 2.0 | (0.3-11.3) |  |
| Hill Dalit | 116 | 42.3 | 1.9 | 8.6 | (6.1-12.0) | 0.010 | 0.7 | (0.1-5.3) | 0.0438 |
| Terai Dalit | 38 | (51.7) | (1.8) | (0.0) | - | 0.010 | (0.0) | - | 0.0438 |
| Newar | 37 | (57.2) | (1.7) | (0.0) | - |  | (0.0) | - |  |
| Hill Janajati | 209 | 47.3 | 1.8 | 4.1 | (2.3-7.2) |  | 0.0 | - |  |
| Terai Janajati | 88 | 54.5 | 1.8 | 4.2 | (1.1-14.9) |  | 1.4 | (0.3-5.8) |  |
| Muslim | 22 | * | * | * | * |  | * | * |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 13 | * | * | * | * |  | * | * |  |
| No | 999 | 44.5 | 1.8 | 4.9 | (3.8-6.2) |  | 0.9 | (0.4-2.1) |  |
| Total | 1,012 | 44.5 | 1.8 | 4.8 | (3.7-6.2) |  | 0.9 | (0.4-2.1) |  |
|  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |
| Ferritin was not normally distributed and is reported as a geometric mean |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. ${ }^{\text {a }}$ ELISA; Erhardt et.al. 2004. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c }}$ Ferritin adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Hemoglobin concentrations adjusted for altitude and smoking. WHO 2011. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {B }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {h }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |

Table 11.5: Anemia Prevalence in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean Hemoglobin ${ }^{\text {a }}$ |  | Any Anemia ${ }^{\text {a,b }}$ |  |  | Mild Anemia ${ }^{\text {a,c }}$ |  |  | Moderate Anemia ${ }^{\text {a,d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 351 | 12.5 | 1.1 | 24.6 | (15.0-37.5) |  | 17.6 | (10.7-27.7) |  | 6.4 | (3.0-13.0) |  |
| Central | 352 | 12.5 | 1.1 | 22.5 | (17.5-28.4) |  | 14.7 | (10.6-20.1) |  | 7.8 | (5.1-11.7) |  |
| Western | 349 | 12.9 | 1.1 | 15.3 | (10.4-21.9) | 0.006 | 11.6 | (8.2-16.0) | 0.076 | 3.8 | (1.8-7.7) | 0.129 |
| Mid-western | 379 | 12.8 | 1.1 | 16.6 | (12.2-22.1) |  | 11.1 | (8.1-15.1) |  | 5.3 | (3.3-8.5) |  |
| Far-western | 412 | 12.7 | 1.1 | 21.2 | (14.9-29.2) |  | 13.9 | (9.8-19.5) |  | 7.2 | (4.5-11.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 288 | 13.1 | 1.1 | 9.2 | (4.7-17.3) |  | 5.9 | (3.2-10.5) |  | 9.0 | (0.9-9.4) |  |
| Hill | 775 | 13.0 | 1.1 | 13.4 | (11.6-15.5) | $<0.001$ | 9.6 | (8.2-11.1) | $<0.001$ | 3.8 | (2.7-5.5) | <0.001 |
| Terai | 780 | 12.3 | 1.1 | 28.7 | (22.4-35.9) |  | 19.5 | (14.8-25.2) |  | 8.9 | (6.2-12.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 213 | 12.6 | 1.1 | 22.3 | (15.9-30.4) |  | 15.8 | (9.7-24.7) |  | 6.5 | (3.7-11.1) |  |
| Rural | 1,630 | 12.6 | 1.1 | 20.3 | (16.8-24.4) | 0.501 | 14.0 | (11.4-17.0) | 0.549 | 6.2 | (4.7-8.2) | 0.897 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 341 | 12.7 | 1.1 | 11.6 | (7.5-17.4) |  | 7.5 | (4.3-12.7) |  | 4.1 | (2.4-6.7) |  |
| 12-13 | 445 | 12.8 | 1.1 | 18.5 | (14.8-22.8) |  | 14.3 | (10.8-18.8) |  | 4.2 | (2.5-6.8) |  |
| 14-15 | 402 | 12.5 | 1.1 | 24.7 | (18.9-31.6) | $<0.001$ | 16.4 | (11.8-22.4) | 0.002 | 7.6 | (5.0-11.4) | 0.031 |
| 16-17 | 321 | 12.6 | 1.1 | 25.6 | (20.1-32.0) |  | 17.2 | (12.5-23.0) |  | 8.5 | (5.4-13.1) |  |
| 18-19 | 334 | 12.7 | 1.1 | 22.5 | (17.7-28.1) |  | 15.0 | (11.0-19.9) |  | 7.5 | (4.9-11.3) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {f }}$ | 54 | 12.4 | 1.1 | 27.4 | (14.9-44.7) |  | 18.2 | (8.6-34.5) |  | 9.1 | (4.9-16.3) |  |
| Primary ${ }^{\text {g }}$ | 537 | 12.5 | 1.1 | 18.4 | (14.6-22.9) |  | 12.3 | (9.8-15.2) | 0.411 | 5.7 | (3.6-8.9) |  |
| Some secondary ${ }^{\text {b }}$ | 991 | 12.7 | 1.1 | 20.6 | (17.0-24.7) |  | 14.5 | (11.2-18.5) |  | 6.0 | (4.4-8.2) |  |
| SLC and above ${ }^{\text {i }}$ | 260 | 12.7 | 1.1 | 21.8 | (16.0-28.9) |  | 14.5 | (10.5-19.7) |  | 7.2 | (3.9-13.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 491 | 12.8 | 1.1 | 17.0 | (14.1-20.4) |  | 10.2 | (8.4-12.5) |  | 6.7 | (4.4-9.9) |  |
| Second | 424 | 12.6 | 1.1 | 21.4 | (15.3-29.0) |  | 15.1 | (10.2-21.8) |  | 5.7 | (3.8-8.4) |  |
| Middle | 336 | 12.6 | 1.1 | 18.5 | (13.8-24.3) | 0.097 | 13.6 | (9.6-18.8) | 0.068 | 5.0 | (2.9-8.2) | 0.654 |
| Fourth | 320 | 12.5 | 1.1 | 23.0 | (16.9-30.6) |  | 16.1 | (11.2-22.6) |  | 6.9 | (4.2-11.1) |  |
| Highest | 272 | 12.6 | 1.1 | 24.0 | (18.0-31.3) |  | 16.8 | (11.5-23.9) |  | 7.3 | (4.3-12.0) |  |

Table 11.5: Cont'd...


[^36]Table 11.6: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}, \mathrm{c}}$ |  | Iron deficiency <br> Ferritin $<\mathbf{1 5 . 0} \boldsymbol{\mu g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  | Iron deficiency anemia Hemoglobin Children 5-11 y <11.5 g/dL, Children $12-14 \mathrm{y}<12.0 \mathrm{~g} / \mathrm{dL}$ and Women $15-49 \mathrm{y}$ $<12.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{d}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 351 | 30.8 | 2.0 | 13.5 | (8.7-20.4) |  | 7.7 | (3.8-15.2) |  |
| Central | 352 | 26.2 | 2.0 | 21.4 | (16.9-26.7) |  | 7.3 | (4.6-11.3) |  |
| Western | 347 | 27.1 | 2.1 | 19.4 | (15.0-24.8) | 0.007 | 6.7 | (4.3-10.4) | 0.860 |
| Mid-western | 379 | 30.6 | 2.0 | 13.7 | (10.9-17.1) |  | 5.6 | (3.7-8.4) |  |
| Far-western | 411 | 28.2 | 2.1 | 19.8 | (14.4-26.5) |  | 7.3 | (4.6-11.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 288 | 27.7 | 2.1 | 19.9 | (13.3-28.6) |  | 4.7 | (2.2-9.6) |  |
| Hill | 774 | 28.1 | 2.0 | 18.4 | (15.6-21.5) | 0.745 | 5.2 | (4.0-6.8) | 0.004 |
| Terai | 778 | 28.4 | 2.0 | 17.3 | (13.7-21.7) |  | 9.1 | (6.2-13.1) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 212 | 26.0 | 2.0 | 17.2 | (10.4-27.0) |  | 7.6 | (3.8-14.4) |  |
| Rural | 1,628 | 28.5 | 2.0 | 18.1 | (15.7-20.7) |  | 7.0 | (5.3-9.1) | . 774 |
| Age, years |  |  |  |  |  |  |  |  |  |
| 10-11 | 341 | 33.3 | 1.8 | 8.5 | (6.3-11.2) |  | 1.8 | (0.7-4.7) |  |
| 12-13 | 445 | 31.5 | 1.9 | 13.6 | (9.8-18.5) |  | 3.2 | (1.7-5.7) |  |
| 14-15 | 402 | 26.4 | 2.1 | 21.0 | (16.4-26.5) | $<0.001$ | 9.4 | (6.1-14.2) | <0.001 |
| 16-17 | 319 | 24.1 | 2.2 | 24.8 | (20.5-29.6) |  | 11.7 | (8.3-16.1) |  |
| 18-19 | 333 | 25.7 | 2.2 | 23.6 | (18.6-29.4) |  | 10.4 | (7.0-15.3) |  |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 54 | 24.4 | 2.1 | 24.5 | (13.7-40.1) |  | 12.5 | (6.9-21.5) |  |
| Primary ${ }^{\text {f }}$ | 536 | 32.8 | 1.9 | 11.8 | (9.2-15.0) | <0.001 | 4.0 | (2.2-7.1) | 0.003 |
| Some secondary ${ }^{\text {g }}$ | 990 | 27.3 | 2.0 | 18.6 | (15.7-21.9) | <0.001 | 7.6 | (5.8-10.0) | 0.003 |
| SLC and above ${ }^{\text {h }}$ | 259 | 24.6 | 2.2 | 25.5 | (19.7-32.2) |  | 8.7 | (5.5-13.4) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 490 | 30.2 | 2.0 | 15.6 | (13.1-18.6) |  | 6.8 | (5.0-9.2) |  |
| Second | 424 | 27.2 | 2.1 | 20.7 | (16.9-25.0) |  | 7.2 | (4.6-10.9) |  |
| Middle | 335 | 28.8 | 2.0 | 17.0 | (12.3-22.9) | 0.003 | 6.5 | (4.1-10.1) | 0.046 |
| Fourth | 320 | 30.2 | 2.0 | 13.4 | (9.5-18.7) |  | 4.5 | (2.4-8.3) |  |
| Highest | 271 | 24.1 | 2.1 | 24.1 | (18.0-31.6) |  | 10.8 | (6.8-16.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 218 | 25.6 | 2.0 | 21.4 | (15.8-28.4) |  | 7.0 | (3.9-12.3) |  |
| Hill Chhetri | 440 | 27.5 | 2.0 | 18.2 | (15.0-22.0) |  | 6.6 | (4.5-9.4) |  |
| Terai Brahmin/ Chhetri | 43 | (32.5) | (1.8) | (6.7) | (1.7-23.0) |  | (2.3) | (0.3-16.7) |  |
| Other Terai caste | 124 | 28.9 | 1.9 | 15.8 | (9.6-24.7) |  | 6.2 | (2.5-14.8) |  |
| Hill Dalit | 231 | 26.8 | 2.0 | 18.2 | (13.0-24.8) |  | 5.3 | (3.1-8.9) | 035 |
| Terai Dalit | 90 | 30.6 | 2.1 | 15.1 | (8.0-26.6) |  | 5.7 | (2.5-12.5) | . 035 |
| Newar | 58 | 28.0 | 2.4 | 19.1 | (8.8-36.4) |  | 4.5 | (1.1-16.5) |  |
| Hill Janajati | 414 | 28.9 | 2.1 | 18.4 | (16.0-21.0) |  | 6.6 | (4.9-8.9) |  |
| Terai Janajati | 185 | 28.8 | 2.2 | 20.1 | (14.2-27.5) |  | 14.1 | (8.6-22.2) |  |
| Muslim | 37 | (27.5) | (2.3) | (18.2) | (9.3-32.8) |  | (12.0) | (4.5-28.7) |  |
| Iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 38 | (29.3) | (2.1) | (18.4) | (7.4-39.1) | 0.999 | (12.7) | (4.0-33.9) | 0155 |
| No | 1,802 | 28.2 | 2.0 | 18.0 | (15.7-20.5) | 0.93 | 6.9 | (5.3-9.0) | 0.15 |
| Total | 1,840 | 28.2 | 2.0 | 18.0 | (15.7-20.5) |  | 7.0 | (5.5-9.0) |  |

[^37]| Characteristics | N | Mean Hemoglobin ${ }^{\text {a }}$ |  | Any Anemia $<12.0 \mathrm{~g} / \mathrm{dL}$ |  |  | Mild Anemia$(11.0-11.9 \mathrm{~g} / \mathrm{dL})$ |  |  | Moderate Anemia (8.0-10.9 g/dL) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 425 \\ & 428 \\ & 427 \\ & 426 \\ & 430 \end{aligned}$ | $\begin{aligned} & 12.6 \\ & 12.8 \\ & 12.9 \\ & 12.9 \\ & 12.7 \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \end{aligned}$ | $\begin{aligned} & 27.4 \\ & 17.3 \\ & 19.0 \\ & 17.4 \\ & 22.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & (21.0-34.9) \\ & (13.5-21.9) \\ & (14.3-24.7) \\ & (13.5-22.1) \\ & (17.6-28.9) \\ & \hline \end{aligned}$ | $<0.001$ | $\begin{array}{r} 20.2 \\ 9.8 \\ 11.2 \\ 11.8 \\ 15.6 \\ \hline \end{array}$ | $\begin{array}{r} (14.2-27.8) \\ (7.6-12.7) \\ (7.9-15.7) \\ (8.1-16.9) \\ (11.8-20.3) \end{array}$ | <0.001 | $\begin{aligned} & 7.1 \\ & 6.5 \\ & 7.8 \\ & 5.6 \\ & 7.0 \end{aligned}$ | $\begin{array}{r} (4.6-10.6) \\ (4.2-10.0) \\ (5.4-11.1) \\ (3.9-8.0) \\ (4.6-10.6) \\ \hline \end{array}$ | 0.871 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{aligned} & 356 \\ & 895 \\ & 885 \\ & \hline \end{aligned}$ | $\begin{aligned} & 13.3 \\ & 13.2 \\ & 12.4 \\ & \hline \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \\ & 1.1 \\ & \hline \end{aligned}$ | $\begin{aligned} & 11.1 \\ & 11.6 \\ & 29.1 \\ & \hline \end{aligned}$ | $\begin{array}{r} (8.0-15.1) \\ (9.6-14.1) \\ (24.8-33.8) \\ \hline \end{array}$ | <0.001 | $\begin{array}{r} 8.2 \\ 7.9 \\ 18.4 \\ \hline \end{array}$ | $\begin{array}{r} (5.6-11.6) \\ (6.3-9.8) \\ (14.9-22.6) \\ \hline \end{array}$ | $<0.001$ | $\begin{array}{r} 2.9 \\ 3.4 \\ 10.2 \\ \hline \end{array}$ | $\begin{array}{r} (1.4-5.9) \\ (2.4-4.8) \\ (8.0-12.9) \\ \hline \end{array}$ | <0.001 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 294 \\ 1842 \\ \hline \end{array}$ | $\begin{aligned} & 12.8 \\ & 12.8 \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \end{aligned}$ | $\begin{aligned} & 18.0 \\ & 20.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & (12.8-24.9) \\ & (18.0-23.9) \end{aligned}$ | 0.275 | $\begin{array}{r} 8.8 \\ 14.0 \end{array}$ | $\begin{array}{r} (6.3-12.3) \\ (11.7-16.5) \end{array}$ | 0.016 | $\begin{aligned} & 9.2 \\ & 6.4 \end{aligned}$ | $\begin{array}{r} (5.1-16.1) \\ (5.3-7.8) \\ \hline \end{array}$ | 0.074 |
| $\begin{array}{\|c\|} \hline \text { Age, years } \\ 15-19 \\ 20-29 \\ 30-39 \\ 40-49 \\ \hline \end{array}$ | $\begin{aligned} & 234 \\ & 857 \\ & 671 \\ & 374 \end{aligned}$ | $\begin{aligned} & 12.6 \\ & 12.8 \\ & 12.8 \\ & 12.9 \\ & \hline \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \\ & \hline \end{aligned}$ | $\begin{aligned} & 22.5 \\ & 18.7 \\ & 20.4 \\ & 23.4 \\ & \hline \end{aligned}$ | $\begin{gathered} (15.6-31.2) \\ (14.7-23.6) \\ (16.7-24.7) \\ (19.0-28.4) \end{gathered}$ | 0.256 | $\begin{aligned} & 14.9 \\ & 13.1 \\ & 13.0 \\ & 13.1 \\ & \hline \end{aligned}$ | $\begin{array}{r} (9.8-22.1) \\ (10.1-16.8) \\ (10.0-16.8) \\ (9.5-17.7) \\ \hline \end{array}$ | 0.911 | $\begin{aligned} & 7.5 \\ & 5.3 \\ & 7.0 \\ & 9.5 \\ & \hline \end{aligned}$ | $\begin{array}{r} (4.2-13.3) \\ (3.5-8.0) \\ (5.2-9.5) \\ (6.6-13.6) \\ \hline \end{array}$ | 0.054 |
| Lactating Status (among those who had given birth in the last 5 years) <br> Yes <br> No | $\begin{aligned} & 592 \\ & 234 \end{aligned}$ | $\begin{aligned} & 12.8 \\ & 12.7 \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \end{aligned}$ | $\begin{aligned} & 18.4 \\ & 24.7 \end{aligned}$ | $\begin{aligned} & (15.0-22.5) \\ & (20.0-30.0) \end{aligned}$ | 0.051 | $\begin{aligned} & 12.4 \\ & 15.1 \end{aligned}$ | $\begin{array}{r} (9.9-15.4) \\ (11.1-20.2) \end{array}$ | 0.332 | $\begin{aligned} & 5.4 \\ & 9.6 \end{aligned}$ | $\begin{array}{r} (3.7-7.8) \\ (5.8-15.5) \end{array}$ | 0.035 |
| Education <br> No education ${ }^{\text {b }}$ <br> Primary ${ }^{\text {c }}$ <br> Some secondary ${ }^{\text {d }}$ SLC and above ${ }^{\text {e }}$ | $\begin{array}{r} 708 \\ 360 \\ 553 \\ 515 \\ \hline \end{array}$ | $\begin{aligned} & 12.8 \\ & 12.8 \\ & 12.8 \\ & 12.8 \\ & \hline \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \end{aligned}$ | $\begin{aligned} & 22.2 \\ & 22.8 \\ & 20.0 \\ & 17.2 \\ & \hline \end{aligned}$ | $\begin{aligned} & (18.7-26.1) \\ & (16.7-30.4) \\ & (15.5-25.3) \\ & (13.7-21.5) \\ & \hline \end{aligned}$ | 0.100 | $\begin{array}{r} 13.4 \\ 14.4 \\ 16.0 \\ 9.7 \end{array}$ | $\begin{array}{r} (10.5-16.8) \\ (9.1-22.0) \\ (12.5-20.2) \\ (7.4-12.7) \\ \hline \end{array}$ | 0.019 | $\begin{aligned} & 8.0 \\ & 8.5 \\ & 4.0 \\ & 7.1 \end{aligned}$ | $\begin{array}{r} (5.9-10.7) \\ (6.0-11.9) \\ (2.6-6.1) \\ (4.3-11.7) \\ \hline \end{array}$ | 0.014 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 480 \\ & 447 \\ & 416 \\ & 398 \\ & 395 \end{aligned}$ | $\begin{aligned} & 13.0 \\ & 12.9 \\ & 12.6 \\ & 12.6 \\ & 12.8 \end{aligned}$ | $\begin{aligned} & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \\ & 1.1 \end{aligned}$ | $\begin{aligned} & 15.6 \\ & 20.8 \\ & 24.8 \\ & 23.2 \\ & 17.3 \end{aligned}$ | $\begin{aligned} & (12.2-19.7) \\ & (16.7-25.7) \\ & (19.9-30.3) \\ & (18.8-28.3) \\ & (12.7-23.1) \end{aligned}$ | 0.004 | $\begin{aligned} & 10.1 \\ & 13.3 \\ & 16.4 \\ & 15.4 \\ & 10.9 \end{aligned}$ | $(6.9-14.6)$ $(10.9-16.1)$ $(12.2-21.5)$ $(12.0-19.6)$ $(7.9-14.8)$ | 0.024 | $\begin{aligned} & 5.2 \\ & 6.9 \\ & 8.4 \\ & 7.3 \\ & 6.0 \end{aligned}$ | $\begin{array}{r} (3.8-7.3) \\ (4.3-10.9) \\ (6.0-11.7) \\ (4.6-11.5) \\ (3.1-11.1) \\ \hline \end{array}$ | 0.426 |

Table 11.7: Cont'd.

| Characteristics | N | Mean Hemoglobin ${ }^{\text {a }}$ |  | $\begin{gathered} \text { Any Anemia } \\ <12.0 \mathrm{~g} / \mathrm{dL} \end{gathered}$ |  |  | $\begin{gathered} \text { Mild Anemia } \\ (11.0-11.9 \mathrm{~g} / \mathrm{dL}) \end{gathered}$ |  |  | Moderate Anemia (8.0-10.9 g/dL) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric <br> Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 282 | 12.8 | 1.1 | 19.5 | (14.6-25.4) |  | 14.0 | (9.8-19.6) |  | 5.5 | (2.8-10.3) |  |
| Hill Chhetri | 508 | 13.1 | 1.1 | 14.5 | (10.4-19.8) |  | 10.1 | (6.9-14.5) |  | 4.3 | (2.7-6.9) |  |
| Terai Brahmin/Chhetri | 61 | 12.7 | 1.1 | 25.3 | (16.6-36.7) |  | 17.9 | (9.6-31.0) |  | 7.4 | (1.6-28.6) |  |
| Other Terai caste | 128 | 12.2 | 1.1 | 30.3 | (21.0-41.6) |  | 15.7 | (9.9-24.0) |  | 13.7 | (8.8-20.6) |  |
| Hill Dalit | 264 | 13.1 | 1.1 | 14.8 | (11.0-19.5) | <0.001 | 11.2 | (8.1-15.4) | <0.001 | 3.6 | (2.1-6.0) | <0.001 |
| Terai Dalit | 91 | 12.4 | 1.1 | 26.7 | (19.4-35.4) |  | 17.1 | (11.0-25.8) |  | 7.7 | (3.4-16.5) |  |
| Newar | 73 | 13.2 | 1.1 | 8.5 | (3.5-18.9) |  | 0.6 | (0.1-4.6) |  | 5.6 | (1.8-15.7) |  |
| Hill Janajati | 492 | 13.2 | 1.1 | 11.0 | (8.2-14.5) |  | 6.7 | (4.8-9.1) |  | 4.2 | (2.3-7.6) |  |
| Terai Janajati | 198 | 12.0 | 1.1 | 48.1 | (35.5-60.9) |  | 34.9 | (23.9-47.9) |  | 13.2 | (9.3-18.3) |  |
| Muslim | 37 | (12.4) | (1.1) | (22.9) | (11.0-41.8) |  | (7.2) | (3.4-14.3) |  | (15.8) | (5.7-36.8) |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 87 | 12.7 | 1.1 | 20.0 | (11.9-31.8) |  | 15.0 | (7.6-27.7) |  | 5.0 | (2.9-8.6) |  |
| No | 2,049 | 12.8 | 1.1 | 20.4 | (18.1-23.0) | 0.879 | 13.2 | (11.3-15.3) | 0.542 | 6.9 | (5.6-8.4) | 0.608 |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 800 | 12.7 | 1.1 | 22.1 | (17.9-27.1) | 0.187 | 14.2 | (10.9-18.3) |  | 7.4 | (5.4-10.0) | 0.362 |
| Negative | 1,136 | 12.8 | 1.1 | 18.7 | (16.2-21.5) | 0.187 | 11.6 | (9.6-13.9) | 0.182 | 6.9 | (5.3-8.9) | 0.362 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 984 | 12.8 | 1.1 | 20.2 | (17.0-24.0) |  | 14.0 | (10.9-17.7) |  | 6.0 | (4.5-8.0) |  |
| No | 1,150 | 12.8 | 1.1 | 20.6 | (17.6-24.0) | 0.874 | 12.8 | (10.7-15.4) | 0.462 | 7.3 | (5.7-9.4) | 0.225 |
| Don't know | 2 | * | * | * | * |  | * | * |  | * | * |  |
| Total | 2,136 | 12.8 | 1.1 | 20.4 | (18.0-23.1) |  | 13.2 | (11.3-15.5) |  | 6.8 | (5.5-8.3) |  |

[^38]Table 11.8: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}, \mathrm{c}}$ |  | Iron deficiency Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  | Iron deficiency anemia Hemoglobin Non-pregnant women $<12.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{d}}$ Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  | 0.014 |  |  | 0.699 |
| Eastern | 424 | 33.8 | 2.2 | 16.4 | (12.8-20.8) |  | 7.3 | (5.7-9.3) |  |
| Central | 428 | 28.8 | 2.2 | 20.3 | (17.5-23.5) |  | 8.1 | (4.9-13.2) |  |
| Western | 425 | 26.2 | 2.2 | 22.8 | (19.9-26.0) |  | 9.2 | (6.3-13.2) |  |
| Mid-western | 425 | 33.2 | 2.1 | 13.8 | (11.1-17.2) |  | 6.4 | (4.7-8.7) |  |
| Far-western | 427 | 29.2 | 2.0 | 16.6 | (12.9-21.2) |  | 7.0 | (4.5-10.7) |  |
| Ecological Region |  |  |  |  |  | 0.923 |  |  | 0.001 |
| Mountain | 355 | 30.8 | 2.2 | 17.9 | (13.9-22.7) |  | 4.6 | (2.4-8.7) |  |
| Hill | 895 | 30.1 | 2.2 | 18.5 | (16.4-20.8) |  | 5.8 | (4.3-7.8) |  |
| Terai | 879 | 29.6 | 2.2 | 19.0 | (16.5-21.8) |  | 9.9 | (7.4-13.2) |  |
| Location |  |  |  |  |  | 0.102 |  |  | 0.944 |
| Urban | 292 | 27.5 | 2.3 | 22.2 | (15.7-30.4) |  | 8.0 | (5.1-12.2) |  |
| Rural | 1,837 | 30.3 | 2.1 | 18.2 | (16.3-20.2) |  | 7.8 | (6.1-9.8) |  |
| Age, years |  |  |  |  |  |  |  |  | 0.130 |
| 15-19 | 232 | 25.1 | 2.1 | 21.9 | (16.5-28.5) | 0.642 | 9.6 | (5.9-15.4) |  |
| 20-29 | 855 | 29.5 | 2.1 | 17.9 | (15.2-21.0) |  | 6.3 | (4.6-8.4) |  |
| 30-39 | 669 | 30.3 | 2.2 | 18.9 | (15.2-23.1) |  | 8.2 | (5.6-12.0) |  |
| 40-49 | 373 | 33.2 | 2.2 | 18.7 | (14.1-24.2) |  | 9.7 | (6.8-13.5) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  | 0.009 |  |  | 0.012 |
| Yes | 590 | 30.1 | 2.0 | 14.2 | (11.1-18.1) |  | 6.0 | (3.9-9.2) |  |
| No | 233 | 29.3 | 2.3 | 21.6 | (16.9-27.3) |  | 11.1 | (7.7-15.7) |  |
| Education |  |  |  |  |  |  |  |  | 0.033 |
| No education ${ }^{\text {e }}$ | 707 | 34.1 | 2.1 | 15.2 | (12.4-18.5) | 0.002 | 6.9 | (5.0-9.5) |  |
| Primary ${ }^{\text {f }}$ | 358 | 31.9 | 2.2 | 16.7 | (12.7-21.5) |  | 9.6 | (6.2-14.7) |  |
| Some secondary ${ }^{\text {g }}$ | 550 | 28.8 | 2.1 | 19.3 | (16.4-22.4) |  | 5.8 | (4.0-8.3) |  |
| SLC and above ${ }^{\text {h }}$ | 514 | 25.5 | 2.2 | 23.7 | (19.4-28.5) |  | 9.7 | (6.9-13.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  | 0.152 |
| Lowest | 479 | 32.1 | 2.1 | 15.1 | (11.8-19.0) | 0.005 | 5.9 | (4.2-8.4) |  |
| Second | 447 | 31.7 | 2.1 | 17.7 | (14.9-20.9) |  | 7.8 | (5.6-10.7) |  |
| Middle | 413 | 31.2 | 2.2 | 17.9 | (14.0-22.5) |  | 9.0 | (5.9-13.3) |  |
| Fourth | 396 | 30.0 | 2.1 | 16.8 | (13.3-20.9) |  | 5.9 | (3.5-9.6) |  |
| Highest | 394 | 26.4 | 2.3 | 24.0 | (19.4-29.3) |  | 9.7 | (6.0-15.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 281 | 23.8 | 2.1 | 27.1 | (21.6-33.3) | 0.001 | 8.6 | (6.0-12.3) | 0.144 |
| Hill Chhetri | 508 | 29.5 | 2.1 | 18.3 | (15.0-22.3) |  | 7.7 | (5.2-11.3) |  |
| Terai Brahmin/Chhetri | 60 | 27.5 | 2.2 | 21.1 | (9.7-40.0) |  | 12.1 | (5.2-25.9) |  |
| Other Terai caste | 128 | 25.7 | 2.1 | 23.1 | (17.4-29.9) |  | 8.7 | (4.7-15.8) |  |
| Hill Dalit | 263 | 32.3 | 2.2 | 16.4 | (12.2-21.6) |  | 6.4 | (4.1-9.9) |  |
| Terai Dalit | 90 | 30.0 | 2.2 | 17.7 | (10.0-29.5) |  | 12.2 | (6.5-21.7) |  |
| Newar | 72 | 32.0 | 2.4 | 18.5 | (11.8-27.9) |  | 6.2 | (2.2-16.1) |  |
| Hill Janajati | 491 | 34.0 | 2.2 | 14.7 | (11.7-18.1) |  | 4.7 | (2.7-8.1) |  |
| Terai Janajati | 197 | 35.7 | 2.1 | 13.7 | (9.1-20.0) |  | 9.9 | (6.0-16.0) |  |
| Muslim | 37 | (29.8) | (2.2) | (16.5) | (5.7-39.2) |  | (8.1) | (2.1-26.5) |  |
| Any iron and folic acid supplementation in the last 6 months Yes No |  |  |  |  |  | 0.416 |  |  | 0.219 |
|  | 87 | 29.1 | 2.1 | 21.9 | (13.3-33.9) |  | 4.8 | (1.6-13.9) |  |
|  | 2,042 | 29.9 | 2.2 | 18.6 | (16.9-20.4) |  | 7.9 | (6.4-9.8) |  |
| Total | 2,129 | 29.9 | 2.2 | 18.7 | (17.1-20.4) |  | 7.8 | (6.3-9.7) |  |

[^39]Table 11.9: Anemia Prevalence in Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean <br> Hemoglobin ${ }^{\text {a }}$ |  | $\begin{gathered} \text { Any Anemia<11.0 } \\ \mathrm{g} / \mathrm{dL} \\ \hline \end{gathered}$ |  | $\begin{gathered} \text { Mild Anemia } \\ (10.0-10.9 \mathrm{~g} / \mathrm{dL}) \end{gathered}$ |  | $\begin{gathered} \text { Moderate Anemia } \\ (7.0-9.9 \mathrm{~g} / \mathrm{dL}) \\ \hline \end{gathered}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 45 | (11.4) | 1.1 | (33.2) | (21.7-47.2) | (27.1) | (18.2-38.2) | (6.2) | (1.6-21.3) |
| Central | 43 | (11.5) | 1.1 | (26.6) | (12.7-47.4) | (11.8) | (2.5-41.0) | (14.8) | (8.7-23.9) |
| Western | 36 | (11.5) | 1.1 | (26.7) | (16.0-40.9) | (18.9) | (11.0-30.5) | (7.8) | (3.0-18.5) |
| Mid-western | 44 | (11.8) | 1.1 | (15.0) | (7.4-28.0) | (9.0) | (4.6-16.9) | (5.9) | (1.6-19.6) |
| Far-western | 36 | (11.6) | 1.1 | (26.8) | (16.9-39.6) | (19.9) | (10.3-34.8) | (6.9) | (1.4-27.1) |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 22 | * | * | * | * | * | * | * | * |
| Hill | 88 | 11.9 | 1.1 | 15.6 | (12.4-19.4) | 10.1 | (7.3-13.7) | 5.5 | (2.8-10.7) |
| Terai | 94 | 11.2 | 1.1 | 36.4 | (23.3-51.8) | 23.3 | (12.7-38.8) | 13.1 | (7.8-21.1) |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 24 | * | * | * | * | * | * | * | * |
| Rural | 180 | 11.5 | 1.1 | 27.7 | (19.8-37.3) | 17.3 | (10.7-26.6) | 10.4 | (6.9-15.4) |
| Age, years |  |  |  |  |  |  |  |  |  |
| 15-19 | 38 | (11.7) | (1.1) | (20.4) | (7.1-46.2) | (17.1) | (4.9-45.3) | (3.3) | (0.7-14.7) |
| 20-29 | 139 | 11.5 | 1.1 | 22.9 | (14.9-33.5) | 14.0 | (8.0-23.3) | 8.9 | (5.4-14.3) |
| 30-49 | 27 | (11.0) | (1.1) | (55.3) | (43.0-67.0) | (33.1) | (17.9-52.0) | (22.2) | (11.0-39.0) |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |
| First trimester | 56 | 12.0 | 1.1 | 16.1 | (8.2-29.1) | 13.4 | (6.2-26.6) | 2.7 | (0.8-8.3) |
| Second trimester | 74 | 11.2 | 1.1 | 31.6 | (22.7-42.2) | 24.5 | (15.5-36.5) | 7.2 | (2.8-17.3) |
| Third trimester | 74 | 11.5 | 1.1 | 29.5 | (21.2-39.4) | 12.4 | (7.0-20.9) | 17.1 | (11.2-25.3) |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 43 | (11.2) | 1.1 | (39.8) | (18.8-65.5) | (21.2) | (9.4-41.0) | (18.7) | (9.5-33.4) |
| Primary ${ }^{\text {c }}$ | 42 | (11.5) | 1.1 | (26.3) | (16.2-39.6) | (19.1) | (10.0-33.5) | (7.2) | (2.4-19.8) |
| Some secondary ${ }^{\text {d }}$ | 61 | 11.6 | 1.1 | 23.8 | (16.6-32.9) | 15.5 | (8.8-26.1) | 8.3 | (4.3-15.3) |
| SLC and above ${ }^{\text {e }}$ | 58 | 11.6 | 1.1 | 21.7 | (10.3-40.1) | 14.6 | (5.3-34.4) | 7.2 | (2.7-17.4) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 48 | (11.6) | (1.1) | (25.5) | (14.2-41.6) | (18.0) | (9.6-31.3) | (7.5) | (1.7-28.2) |
| Second | 42 | (11.5) | (1.1) | (30.1) | (15.2-50.9) | (16.4) | (8.0-30.9) | (13.7) | (6.0-28.2) |
| Middle | 37 | (11.6) | (1.1) | (16.4) | (5.9-38.0) | (10.8) | (2.7-34.7) | (5.6) | (2.9-10.5) |
| Fourth | 54 | 11.3 | 1.1 | 32.7 | (23.9-43.0) | 21.6 | (14.7-30.6) | 11.1 | (6.6-18.1) |
| Highest | 23 | * | * | * | * | * | * | * | * |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 60 | 11.6 | 1.1 | 27.1 | (16.0-41.9) | 22.0 | (12.1-36.6) | 5.0 | (1.3-17.6) |
| No | 144 | 11.5 | 1.1 | 26.7 | (18.9-36.3) | 15.2 | (9.7-23.1) | 11.5 | (7.9-16.4) |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 108 | 11.5 | 1.1 | 18.9 | (11.8-28.7) | 13.7 | (8.1-22.2) | 5.2 | (2.0-12.7) |
| No | 96 | 11.5 | 1.1 | 34.0 | (24.0-45.7) | 20.3 | (12.0-32.1) | 13.7 | (9.1-20.2) |
| Total | 204 | 11.5 | 1.1 | 26.8 | (19.8-35.3) | 17.1 | (11.1-25.5) | 9.7 | (6.4-14.3) |

[^40]Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Sample sizes for pregnant women designed to be only nationally representative.
For all stratifications, no significant test were performed because small sample size ${ }^{\mathrm{a}}$ Hemoglobin concentrations are adjusted for altitude and smoking. WHO 2011
${ }^{\mathrm{b}}$ Includes those who have never attended school.
${ }^{\text {c I Includes those who have completed } 0-5 \text { years of school }}$
${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
${ }^{\mathrm{e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

Table 11.10: Inflammation Adjusted Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}, \mathrm{c}}$ |  | Iron deficiency Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  | Iron deficiency anemia Hemoglobin Pregnant Women $<11.0 \mathrm{~g} / \mathrm{dl}^{\mathrm{d}}$ and Ferritin $<15.0 \mathrm{ug} / \mathrm{L}^{\mathrm{a}, \mathrm{b} . \mathrm{c}}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 43 | (29.7) | (1.9) | (14.4) | (5.8-31.3) | (9.7) | (3.3-25.3) |
| Central | 44 | (27.2) | (2.0) | (16.2) | (10.2-24.8) | (2.4) | (1.8-3.2) |
| Western | 36 | (28.3) | (1.8) | (12.4) | (3.2-38.0) | (5.0) | (0.7-29.3) |
| Mid-western | 42 | (30.8) | (1.8) | (11.5) | (6.3-20.1) | (2.9) | (0.4-19.6) |
| Far-western | 36 | (27.1) | (1.7) | (12.7) | (4.9-28.9) | (6.9) | (1.4-27.1) |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 21 | * | * | * | * | * | * |
| Hill | 86 | 30.6 | 1.9 | 10.3 | (8.0-13.3) | 2.9 | (1.4-5.7) |
| Terai | 94 | 27.1 | 1.9 | 16.6 | (9.5-27.4) | 7.0 | (3.1-15.1) |
| Location |  |  |  |  |  |  |  |
| Urban | 25 | (31.2) | (1.6) | (5.1) | (3.4-7.7) | (0.0) | - |
| Rural | 176 | 28.2 | 1.9 | 15.3 | (10.5-21.6) | 5.6 | (3.0-10.3) |
| Age, years |  |  |  |  |  |  |  |
| 15-19 | 37 | (29.4) | (1.6) | (8.1) | (5.3-12.3) | (5.3) | (3.0-9.1) |
| 20-29 | 138 | 29.2 | 2.0 | 14.3 | (10.2-19.7) | 2.9 | (1.2-7.2) |
| 30-49 | 27 | (24.1) | (1.9) | (22.4) | (8.0-48.7) | (15.6) | (4.4-42.4) |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |
| First trimester | 56 | 35.4 | 1.8 | 6.3 | (3.1-12.4) | 1.8 | (0.4-7.3) |
| Second trimester | 73 | 30.4 | 1.9 | 14.6 | (7.3-27.1) | 4.4 | (1.2-14.9) |
| Third trimester | 72 | 22.7 | 1.9 | 19.6 | (12.8-28.8) | 8.1 | (3.6-17.4) |
| Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 43 | (24.9) | (1.9) | (13.7) | (5.4-30.5) | (9.0) | (3.3-22.4) |
| Primary ${ }^{\text {f }}$ | 40 | (31.7) | (2.0) | (15.0) | (9.2-23.5) | (1.7) | (0.2-11.3) |
| Some secondary ${ }^{\text {g }}$ | 60 | 29.2 | 2.0 | 11.2 | (7.8-16.0) | 4.4 | (2.4-7.9) |
| SLC and above ${ }^{\text {h }}$ | 58 | 27.9 | 1.8 | 16.8 | (7.7-33.1) | 5.8 | (1.4-20.6) |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 47 | (29.5) | (1.9) | (17.2) | (10.7-26.3) | (4.8) | (1.1-18.2) |
| Second | 40 | (34.0) | (1.8) | (5.9) | (4.0-8.5) | (3.8) | (3.1-4.6) |
| Middle | 37 | (27.1) | (1.9) | (15.5) | (6.0-34.5) | (5.6) | (2.9-10.5) |
| Fourth | 53 | 26.2 | 2.0 | 14.8 | (7.0-28.4) | 5.2 | (1.3-17.8) |
| Highest | 24 | * | * | * | * | * | * |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |
| Yes | 60 | 27.4 | 1.8 | 18.3 | (10.6-29.7) | 5.8 | (1.7-17.8) |
| No | 141 | 28.9 | 1.9 | 12.6 | (7.9-19.6) | 4.8 | (2.3-9.5) |
| Total | 201 | 28.5 | 1.9 | 14.2 | (9.9-20.1) | 5.1 | (2.7-9.4) |

[^41]
## During Pregnancy

This chapter presents findings on vitamin A status assessed using MRDR among children 6-59 months and non-pregnant women 15-49 years. MRDR measures vitamin A liver stores and is a preferred and sensitive indicator of vitamin A status. Blood circulating retinol is under homeostatic control of vitamin A liver stores and as a result, it is common that retinol levels do not change after intervention especially in settings where vitamin A status is adequate or marginal. Also, retinol is influenced by inflammation which causes it to decrease, whereas MRDR shows minimal influence of inflammation. MRDR is used to assess deficiency through sufficiency but is not used for defining toxic levels. MRDR was assessed among a randomly selected subsample of the two survey population groups (Tanumihardjo et.al. 2011). After the first blood collection a challenge dose of 3.4 dihydro retinol (vitamin $\mathrm{A}_{2}$ ) was administered to the participants. A second venous blood sample was collected 4-6 hours later for the MRDR measurement. VAD is defined as MRDR value $\geq 0.060$. MRDR values were not normally distributed so the geometric mean is reported. Tables for retinol binding protein (children 6-59 months, adolescent boys and girls, and women of reproductive age) and retinol (children 6-59 months and women of reproductive age) are in Annex 11.

# 12.1 Geometric Mean MRDR and Vitamin A Deficiency Prevalence among Children 6-59 Months 

The MRDR results were available for a total of 659 children 6-59 months. The geometric mean MRDR value was $0.013 \pm 2.798$ and a total of four percent of children had vitamin A deficiency (Table 12.1). Prevalence of vitamin A deficiency among children 6-59 months varied by development regions, ecological regions, maternal education and ethnicity. Vitamin A deficiency prevalence ranged from none in Western region and Far-western region to seven percent each in Central and Eastern region. One percent of children in the Mountain and Hill and seven percent in the Terai suffered from vitamin A deficiency. Higher prevalence of Vitamin A deficiency was observed among children with mothers with no education (14 percent).

### 12.2 Geometric Mean MRDR and Vitamin A Deficiency Prevalence among Non-Pregnant Women 15-49 Years

The MRDR results were available for a total of 529 non-pregnant women 15-49 years. The geometric mean MRDR value was $0.010 \pm 3.876$ and a total of three percent of non-pregnant women had vitamin A deficiency (Table 12.2). Prevalence of vitamin A deficiency among nonpregnant women varied by ecological region ranging from none in the Mountain to one percent in Hill and five percent in the Terai. By ethnicity, 12 percent of women were deficient among the other Terai caste group.

### 12.3 Status of Vision Problem in Last Pregnancy among Adolescent Girls and Women 15-19 Years

Adolescent girls 10-19 years and women 15-49 years who had given birth in the 5 years prior to the survey self-reported problems with their vision during the pregnancy and were asked whether the problems occurred during the day, during the night, or both during the day and the night.

Among 1865 adolescent girls, only 89 had given birth in the last 5 years and among them 11 (nine percent) reported having vision problem during their pregnancy. Out of 11 adolescent having vision problem, seven reported having the problem during day time only and four reported having the problem during night time only (data not shown).

Table 12.3 shows that nine percent of women 15-49 years who had given birth in the last 5 years had vision problem either in the day or in the night at some point during the previous pregnancy. A total of three percent reported having night blindness (did not report difficulty with vision during the day). The proportion of women reporting vision problem varied by development region, age wealth quintile and ethnicity. Women reported vision problem range from five percent in Central region to 13 percent in Eastern and Far-western region. By age group it ranged from seven percent among women 20-29 years to 18 percent among 40-49 years. Vision problem decreased with increasing wealth quintile (Four percent among the
highest and fourth quintile to 14 percent among lowest quintile group). The highest proportion of women reporting vision problem were among Terai Dalit cast group (20 percent).

Night blindness varied by age, education and wealth quintile. The proportion of women reporting night blindness increases with increase age where one percent among 15-19 years had night blindness and 12 percent among 40-49 years had it. Higher proportion of women with no education had night blindness (six percent) while less than one percent among SLC and above level of education had it. Night blindness range from less than one percent in middle wealth quintile group to seven percent among lowest quintile group (Table 12.3).

## List of Tables

For more information on the modified relative dose response (MRDR) vitamin A Deficiency Status and vision problem during pregnancy, see the following tables:

Table 12.1: Geometric Mean Modified Relative Dose Response (MRDR) and Vitamin A Deficiency Prevalence in Children 6-59 Months

Table 12.2: Mean Modified Relative Dose Response (MRDR) and Vitamin A Deficiency Prevalence in Non-Pregnant Women 15-49 Years
Table 12.3: Vision Problem and Night Blindness During Last Pregnancy in Reproductive Age Women 15-49 Years

Table 12.1: Geometric Mean Modified Relative Dose Response (MRDR) and Vitamin A Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | MRDR |  | Vitamin A deficiency MRDR $\geq \mathbf{0 . 0 6 0}{ }^{\text {a }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 139 | 0.015 | 3.147 | 6.5 | (2.4-16.8) |  |
| Central | 125 | 0.013 | 2.918 | 7.0 | (3.5-13.6) |  |
| Western | 131 | 0.011 | 2.920 | 0.0 | (0.0-0.1) | 0.004 |
| Mid-western | 129 | 0.015 | 1.995 | 1.9 | (0.5-7.8) |  |
| Far-western | 135 | 0.013 | 2.288 | 0.0 | - |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 106 | 0.012 | 2.583 | 1.0 | (0.1-6.3) |  |
| Hill | 276 | 0.010 | 2.263 | 1.2 | (0.7-2.1) | <0.001 |
| Terai | 277 | 0.016 | 3.177 | 7.3 | (3.9-13.4) |  |
| Location |  |  |  |  |  |  |
| Urban | 86 | 0.019 | 2.150 | 1.9 | (0.3-11.4) | 0327 |
| Rural | 573 | 0.012 | 2.865 | 4.6 | (2.6-7.8) | 327 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 8 | * | * | * | * |  |
| 9-11 | 23 | * | * | * | * |  |
| 12-17 | 49 | (0.011) | (2.790) | (6.1) | (1.4-22.5) |  |
| 18-23 | 53 | 0.015 | 2.398 | 3.2 | (0.4-21.2) | 0.207 |
| 24-35 | 156 | 0.014 | 2.462 | 5.9 | (2.4-14.0) |  |
| 36-47 | 187 | 0.012 | 2.864 | 1.3 | (0.4-4.6) |  |
| 48-59 | 183 | 0.014 | 3.173 | 4.5 | (2.0-9.9) |  |
| 6-23 | 133 | 0.014 | 2.641 | 5.6 | (2.2-13.6) | 0.316 |
| 24-59 | 526 | 0.013 | 2.844 | 3.8 | (2.1-7.0) | 0.316 |
| Sex |  |  |  |  |  |  |
| Male | 333 | 0.014 | 2.665 | 3.8 | (2.2-6.7) | 0.553 |
| Female | 326 | 0.012 | 2.949 | 4.6 | (2.3-9.1) | 0.553 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 85 | 0.015 | 3.375 | 13.7 | (5.8-29.3) |  |
| Primary ${ }^{\text {c }}$ | 74 | 0.011 | 2.228 | 0.0 | - |  |
| Some secondary ${ }^{\text {d }}$ | 94 | 0.010 | 2.972 | 3.0 | (0.7-11.7) | <0.001 |
| SLC and above ${ }^{\text {e }}$ | 106 | 0.012 | 2.310 | 1.9 | (0.3-12.4) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 163 | 0.013 | 2.635 | 5.0 | (2.6-9.6) |  |
| Second | 134 | 0.012 | 2.405 | 5.0 | (2.0-11.9) |  |
| Middle | 130 | 0.013 | 3.317 | 5.1 | (1.9-13.0) | 0.101 |
| Fourth | 122 | 0.016 | 2.452 | 6.1 | (2.2-16.1) |  |
| Highest | 110 | 0.012 | 3.028 | 0.0 | - |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 65 | 0.012 | 2.610 | 1.4 | (0.2-9.5) |  |
| Hill Chhetri | 154 | 0.013 | 2.201 | 0.0 | - |  |
| Terai Brahmin/Chhetri | 13 | * | * | * | * |  |
| Other Terai caste | 46 | (0.017) | (3.536) | (10.1) | (3.0-28.9) |  |
| Hill Dalit | 103 | 0.012 | 2.207 | 0.0 | - |  |
| Terai Dalit | 27 | (0.016) | (3.535) | (14.7) | (5.8-32.7) | <0.001 |
| Newar | 19 | * | * | * | * |  |
| Hill Janajati | 156 | 0.010 | 2.695 | 3.5 | (1.8-6.9) |  |
| Terai Janajati | 63 | 0.016 | 3.536 | 6.2 | (1.5-22.6) |  |
| Muslim | 13 | * | * | * | * |  |
| Vitamin A supplement intake during mass campaign March 2016 |  |  |  |  |  |  |
| Yes | 610 | 0.013 | 2.798 | 4.4 | (2.5-7.5) |  |
| No | 46 | (0.013) | (2.500) | (2.1) | (0.3-13.8) | 0.462 |
| Don't know | 3 | * |  | , | * |  |
| Baal Vita micronutrient powder intake during last 7 days |  |  |  |  |  |  |
| Yes | 6 | * | * | * | * |  |
| No | 653 | 0.013 | 2.798 | 4.3 | (2.5-7.2) |  |
| Total | 659 | 0.013 | 2.798 | 4.2 | (2.4-7.1) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Tanumihardjo 2011. |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |
| ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more | ars of s | ol. SLC: School Lea | Certifica |  |  |  |

Table 12.2: Mean Modified Relative Dose Response (MRDR) and Vitamin A Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | MRDR |  | Vitamin A deficiency MRDR $\geq \mathbf{0 . 0 6 0}{ }^{\mathrm{a}}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 109 | 0.010 | 4.991 | 3.6 | (1.1-11.4) | 0.714 |
| Central | 106 | 0.011 | 3.801 | 3.9 | (1.3-10.7) |  |
| Western | 102 | 0.010 | 3.362 | 1.1 | (0.2-7.7) |  |
| Mid-western | 104 | 0.010 | 2.854 | 2.2 | (0.5-8.8) |  |
| Far-western | 108 | 0.009 | 4.126 | 3.0 | (0.9-9.4) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 89 | 0.006 | 4.202 | 0.0 | - | 0.013 |
| Hill | 217 | 0.008 | 3.520 | 0.8 | (0.2-2.5) |  |
| Terai | 223 | 0.013 | 3.961 | 5.2 | (2.6-10.1) |  |
| Location |  |  |  |  |  |  |
| Urban | 73 | 0.012 | 3.058 | 4.2 | (1.2-13.4) | 0.548 |
| Rural | 456 | 0.010 | 4.007 | 2.8 | (1.4-5.6) |  |
| Age, years |  |  |  |  |  |  |
| 15-19 | 42 | (0.013) | (2.951) | (0.0) | - | 0.486 |
| 20-29 | 213 | 0.009 | 4.217 | 2.2 | (0.8-5.7) |  |
| 30-39 | 187 | 0.011 | 3.780 | 3.8 | (1.5-9.3) |  |
| 40-49 | 87 | 0.010 | 3.630 | 4.2 | (1.0-15.9) |  |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 171 | 0.010 | 4.080 | 4.3 | (1.7-10.4) | 0.431 |
| Primary ${ }^{\text {c }}$ | 86 | 0.009 | 3.345 | 4.2 | (0.9-16.6) |  |
| Some secondary ${ }^{\text {d }}$ | 131 | 0.011 | 3.205 | 1.6 | (0.4-6.3) |  |
| SLC and above ${ }^{\text {e }}$ | 141 | 0.010 | 4.557 | 2.0 | (0.6-6.7) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 105 | 0.007 | 4.071 | 0.0 | - | 0.093 |
| Second | 121 | 0.010 | 4.205 | 3.7 | (1.1-12.3) |  |
| Middle | 94 | 0.010 | 4.046 | 2.4 | (0.4-12.4) |  |
| Fourth | 102 | 0.011 | 4.225 | 6.2 | (2.3-15.3) |  |
| Highest | 107 | 0.012 | 3.098 | 2.0 | (0.6-6.9) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 78 | 0.012 | 2.757 | 2.8 | (0.8-9.4) | 0.005 |
| Hill Chhetri | 123 | 0.009 | 3.705 | 1.9 | (0.4-9.3) |  |
| Terai Brahmin/Chhetri | 16 | * | * | * | * |  |
| Other Terai caste | 31 | (0.024) | (2.700) | (12.2) | (4.3-29.8) |  |
| Hill Dalit | 65 | 0.009 | 4.430 | 0.0 | - |  |
| Terai Dalit | 25 | (0.011) | (5.391) | (7.6) | (1.8-27.6) |  |
| Newar | 20 | * | * | * | * |  |
| Hill Janajati | 112 | 0.007 | 3.581 | 0.6 | (0.1-4.1) |  |
| Terai Janajati | 51 | 0.008 | 5.317 | 1.1 | (0.1-7.9) |  |
| Muslim | 6 | * | * | * | * |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Yes | 0 | * | * | * | * |  |
| No | 529 | 0.010 | 3.876 | 3.0 | (1.6-5.5) | - |
| Total | 529 | 0.010 | 3.876 | 3.0 | (1.6-5.5) |  |

[^42]Table 12.3: Vision Problem and Night Blindness ${ }^{1}$ During Last Pregnancy in Reproductive Age Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | $\mathbf{N}^{2}$ | Vision Problem (Day or Night) During Last Pregnancy |  |  | Night Blindness but Didn't have Difficulty with Vision During Day |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |
| Eastern | 182 | 12.9 | (8.5-19.0) |  | 4.0 | (1.5-10.4) |  |
| Central | 193 | 4.7 | (2.5-8.7) |  | 1.2 | (0.3-4.0) |  |
| Western | 162 | 5.9 | (2.7-12.4) | 0.002 | 5.6 | (2.5-12.2) | 0.050 |
| Mid-western | 199 | 11.2 | (6.7-17.9) |  | 2.4 | (1.2-5.0) |  |
| Far-western | 207 | 13.2 | (8.8-19.2) |  | 5.1 | (2.8-9.1) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 167 | 14.3 | (10.3-19.5) |  | 6.5 | (4.1-10.2) |  |
| Hill | 421 | 9.1 | (6.7-12.3) | 0.075 | 2.8 | (1.4-5.3) | 0.374 |
| Terai | 355 | 6.9 | (4.4-10.7) |  | 3.0 | (1.4-6.2) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 111 | 5.8 | (2.4-13.4) | 0.447 | 1.8 | (0.4-7.1) | 0.475 |
| Rural | 832 | 8.8 | (6.8-11.2) | 0.44 | 3.3 | (2.1-5.2) | 0.47 |
| Age, years |  |  |  |  |  |  |  |
| 15-19 | 35 | (12.1) | (3.8-32.7) |  | (1.1) | (0.1-8.3) |  |
| 20-29 | 645 | 6.7 | (4.9-9.0) | 0.044 | 2.5 | (1.4-4.3) | 0.020 |
| 30-39 | 230 | 12.0 | (8.8-16.2) |  | 4.5 | (2.3-8.6) | 0.020 |
| 40-49 | 33 | (17.9) | (5.5-44.7) |  | (12.2) | (2.7-41.2) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Yes | 595 | 7.9 | (5.8-10.5) | 0.485 | 2.4 | (1.4-4.4) | 0.097 |
| No | 235 | 9.7 | (6.7-13.7) |  | 4.4 | (2.3-8.1) | , 097 |
| Pregnancy Status |  |  |  |  |  |  |  |
| Pregnant | 113 | 8.6 | (4.7-15.1) | 0.858 | 4.1 | (1.5-10.7) | 0.459 |
| Non-pregnant | 830 | 8.4 | (6.8-10.5) |  | 3.0 | (2.0-4.5) |  |
| Education |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 262 | 11.0 | (7.8-15.2) |  | 6.3 | (3.6-10.8) |  |
| Primary ${ }^{\text {b }}$ | 171 | 10.0 | (6.2-15.8) | 066 | 3.4 | (1.0-11.0) | 0.003 |
| Some secondary ${ }^{\text {c }}$ | 255 | 9.0 | (5.9-13.4) | . 066 | 2.4 | (1.1-5.5) | 0.003 |
| SLC and above ${ }^{\text {d }}$ | 255 | 4.9 | (2.8-8.7) |  | 0.9 | (0.4-2.3) |  |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 275 | 14.0 | (10.0-19.4) |  | 6.7 | (4.1-10.9) |  |
| Second | 202 | 11.4 | (8.1-15.6) |  | 4.3 | (2.1-8.7) |  |
| Middle | 160 | 8.8 | (4.7-15.9) | 0.001 | 0.6 | (0.1-2.2) | 0.008 |
| Fourth | 173 | 4.2 | (2.4-7.3) |  | 2.5 | (1.1-5.7) |  |
| Highest | 133 | 3.7 | (1.4-9.3) |  | 1.3 | (0.3-6.0) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 100 | 6.9 | (3.5-13.1) |  | 1.9 | (0.7-5.2) |  |
| Hill Chhetri | 248 | 11.9 | (7.6-18.2) |  | 4.7 | (2.2-9.7) |  |
| Terai Brahmin/Chhetri | 24 | * | * |  | * | * |  |
| Other Terai caste | 64 | 5.6 | (1.7-16.3) |  | 4.0 | (1.0-14.3) |  |
| Hill Dalit | 146 | 10.8 | (6.7-16.9) |  | 2.3 | (1.1-4.8) |  |
| Terai Dalit | 39 | (19.6) | (10.3-34.1) | 0.012 | (0.0) | - | 0.062 |
| Newar | 31 | (7.8) | (2.5-21.8) |  | (0.0) | - |  |
| Hill Janajati | 207 | 4.2 | (2.5-7.0) |  | 1.2 | (0.3-4.7) |  |
| Terai Janajati | 60 | 11.2 | (4.8-23.7) |  | 5.1 | (1.2-19.5) |  |
| Muslim | 23 | * | * |  | * | * |  |
| Total | 943 | 8.5 | (6.7-10.6) |  | 3.2 | (2.0-4.8) |  |
| Note: N unweighted. All estimates account for weighting and compels sample design. |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |
| ${ }^{1}$ Women who reported night blindness but did not report difficulty with vision during the day. |  |  |  |  |  |  |  |
| ${ }^{2}$ Women who had given birth in the last 5 years. |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |
| ${ }^{\text {c Includes those who have completed 6-9 years of school. }}$ |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 10 and m | years | school. S | School Leavin | ertificate. |  |  |  |

## Zinc Status

Zinc is essential for normal child growth, proper immune system function and healthy pregnancy (King JC, 2016; Lamberti LH, 2016). Zinc deficiency among children has deleterious effects on immunity making them more prone to infections, such as diarrhea and pneumonia. Inadequate zinc from the diet, malabsorption of zinc, or excess losses of zinc during diarrhea can cause zinc deficiency (Hambidge M, 2000). This chapter presents zinc status and prevalence of deficiency among children 6-59 months and among non-pregnant women 15-49 years. Zinc data were collected from participants who were not fasting. The zinc data are not normally distributed and the geometric mean is presented in tables instead of the mean.

### 13.1 Geometric Mean Zinc and Prevalence of Zinc Deficiency among Children 6-59 Months

Table 13.1 shows the geometric mean zinc concentration and prevalence of zinc deficiency among 1,647 children $6-59$ months. The geometric mean zinc concentration was $81.4 \mu \mathrm{~g} / \mathrm{dL}$. Overall, two in ten ( 21 percent) children had zinc deficiency. Prevalence of zinc deficiency among children varied by development region, ecological region, location, age of children, wealth quintile and ethnicity. Zinc deficiency ranged from 13 percent in the Western region to 30 percent in the Far-western region. In the Mountain, Hill and Terai the prevalence of zinc deficiency was 28 percent, 23 percent and 18 percent, respectively. Higher proportions of children from rural areas suffered from zinc deficiency compared to children from urban areas ( 22 percent versus 12 percent). Over three in ten ( 29 percent) children in the lowest wealth quintile had zinc deficiency and the prevalence ranged from 17-20 percent for the other wealth quintile groups. By ethnicity, 28 percent of children from the Terai Janajati and 26 percent from the Hill Chhetri groups suffered from zinc deficiency.

### 13.2 Geometric Mean Zinc and Prevalence of Zinc Deficiency among Non-Pregnant Women 15-49 Years

Table 13.2 shows the geometric mean zinc concentration and prevalence of zinc deficiency among 2,132 non-pregnant women 15-49 years. The geometric mean zinc concentration among women was $77.2 \mu \mathrm{~g} / \mathrm{dL}$. Overall, a quarter ( 24 percent) of women had zinc deficiency. Prevalence of zinc deficiency among women varied by development region, lactation status, education and wealth quintile. Zinc prevalence ranged from 20 percent in the Western region to 32 percent in the Far-western region. In the Mountain 29 percent of women had zinc deficiency and in the Hill and Terai 24 percent each had zinc deficiency. Women who were not currently lactating suffered more from zinc deficiency compared with women who were currently lactating ( 31 percent versus 23 percent). Zinc status of women varied by education level where women with no education had a 29 percent prevalence of zinc deficiency and women in the highest education group (SLC and above level of education) had a 21 percent prevalence of zinc deficiency. Prevalence of zinc deficiency decreases with the household wealth quintile where almost one-third women ( 32 percent) had zinc deficiency among the lowest quintile compared to one-fifth of women among the highest and fourth wealth quintile group (Table 13.2).

## List of Tables

For more information on the zinc status, see the following tables:
Table 13.1: Inflammation Adjusted Mean Serum Zinc and Zinc Deficiency Prevalence in Children 659 Months
Table 13.2: Mean Serum Zinc and Zinc Deficiency Prevalence in Non-Pregnant Women 15-49 Years

Table 13.1: Inflammation Adjusted Mean Serum Zinc and Zinc Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Zinc $\mu \mathrm{g} / \mathrm{dL}^{\text {a }}$ b |  | $\qquad$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 322 | 86.1 | 1.6 | 20.3 | (14.5-27.7) |  |
| Central | 345 | 81.1 | 1.5 | 20.7 | (18.0-23.8) |  |
| Western | 277 | 85.4 | 1.5 | 12.9 | (8.9-18.2) | <0.001 |
| Mid-western | 337 | 75.9 | 1.7 | 23.9 | (17.6-31.5) |  |
| Far-western | 366 | 75.0 | 1.7 | 30.3 | (24.9-36.3) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 266 | 76.2 | 1.7 | 28.1 | (23.6-33.0) |  |
| Hill | 684 | 79.2 | 1.6 | 22.8 | (19.4-26.5) | 0.008 |
| Terai | 697 | 84.2 | 1.5 | 17.9 | (14.8-21.4) |  |
| Location |  |  |  |  |  |  |
| Urban | 210 | 91.2 | 1.4 | 11.5 | (7.7-17.0) |  |
| Rural | 1,437 | 80.1 | 1.6 | 22.0 | (19.6-24.7) | 0.001 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 64 | 90.4 | 1.5 | 10.6 | (5.2-20.5) |  |
| 9-11 | 84 | 75.2 | 1.6 | 26.9 | (16.9-39.9) |  |
| 12-17 | 170 | 80.4 | 1.6 | 15.9 | (11.4-21.9) |  |
| 18-23 | 156 | 75.8 | 1.6 | 30.9 | (22.9-40.2) | <0.001 |
| 24-35 | 384 | 84.9 | 1.5 | 17.8 | (13.5-22.9) |  |
| 36-47 | 402 | 80.5 | 1.6 | 23.0 | (19.0-27.6) |  |
| 48-59 | 387 | 82.2 | 1.5 | 19.4 | (15.5-24.1) |  |
| 6-23 | 474 | 79.2 | 1.6 | 22.0 | (18.1-26.5) |  |
| 24-59 | 1,173 | 82.4 | 1.6 | 20.1 | (17.4-23.2) | 0.613 |
| Sex |  |  |  |  |  |  |
| Male | 837 | 80.6 | 1.6 | 21.1 | (18.5-23.9) |  |
| Female | 810 | 82.5 | 1.5 | 20.3 | (17.2-23.7) | 0.988 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 221 | 75.2 | 1.6 | 27.8 | (21.0-35.7) |  |
| Primary ${ }^{\text {e }}$ | 169 | 82.4 | 1.6 | 24.7 | (17.9-33.1) |  |
| Some secondary ${ }^{\text {f }}$ | 238 | 81.8 | 1.6 | 17.7 | (13.4-22.9) | 0.084 |
| SLC and above ${ }^{\text {b }}$ | 220 | 81.3 | 1.6 | 25.2 | (19.3-32.3) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 461 | 72.9 | 1.7 | 29.2 | (24.6-34.2) |  |
| Second | 340 | 83.4 | 1.6 | 18.0 | (14.4-22.3) |  |
| Middle | 291 | 81.4 | 1.5 | 17.9 | (14.6-21.7) | <0.001 |
| Fourth | 304 | 83.2 | 1.5 | 20.3 | (15.3-26.4) |  |
| Highest | 251 | 88.1 | 1.5 | 17.0 | (11.7-24.1) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 149 | 83.6 | 1.6 | 17.8 | (11.6-26.2) |  |
| Hill Chhetri | 385 | 75.7 | 1.6 | 26.0 | (20.9-31.9) |  |
| Terai Brahmin/Chhetri | 42 | (88.0) | (1.4) | (11.0) | (3.8-28.1)) |  |
| Other Terai caste | 130 | 83.1 | 1.5 | 18.3 | (14.0-23.5) |  |
| Hill Dalit | 263 | 83.1 | 1.6 | 19.5 | (15.1-24.8) |  |
| Terai Dalit | 85 | 82.7 | 1.6 | 19.9 | (12.3-30.7) | 0.016 |
| Newar | 50 | 94.5 | 1.4 | 14.1 | (6.2-29.0) |  |
| Hill Janajati | 375 | 78.8 | 1.6 | 22.3 | (18.4-26.8) |  |
| Terai Janajati | 117 | 80.2 | 1.6 | 28.2 | (19.1-39.5) |  |
| Muslim | 49 | (93.6) | (1.4) | (8.6) | (2.8-23.2) |  |
| Baal vita micronutrient supplementation during last 7 days |  |  |  |  |  |  |
| Yes | 30 | (86.5) | (1.4) | (11.2) | (2.8-35.6) | 0.079 |
| No | 1,617 | 81.3 | 1.6 | 20.9 | (18.7-23.3) |  |
| Zinc supplementation during last 7 days |  |  |  |  |  |  |
| Yes | 19 | * | * | * | * |  |
| No | 1,628 | 81.5 | 1.6 | 20.7 | (18.5-23.1) |  |
| Zinc Supplement during last 24 hours |  |  |  |  |  |  |
| Yes | 3 | * | * | * | * |  |
| No | 1,644 | 81.4 | 1.6 | 20.7 | (18.5-23.1) |  |

Table 13.1: Cont'd...

| Characteristics | N | Zinc $\boldsymbol{\mu g} / \mathrm{dL}^{\text {a, }}$ b |  | Zinc deficiency serum zinc $<65 \mu \mathrm{~g} / \mathrm{dL}$ or $57 \mu \mathrm{~g} / \mathrm{dL}^{\mathrm{a}, \mathrm{b}, \mathrm{c}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Time since last consumed food or beverage |  |  |  |  |  |  |
| >8 hours | 4 | * | * | * | * |  |
| 4-8 hours | 50 | 81.8 | 1.6 | 24.8 | (13.9-40.3) | 0.216 |
| $0-<4$ hours | 1,593 | 81.4 | 1.6 | 20.6 | (18.3-23.0) |  |
| Total | 1,647 | 81.4 | 1.6 | 20.7 | (18.5-23.1) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Atomic absorption flame emission spectroscopy; Dipeitro ES et.al. 1988
${ }^{\text {b }}$ Zinc adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction
${ }^{\mathrm{c}}$ IZINCG 2007. Zinc deficiency defined as serum zinc less than 65 or $57 \mu \mathrm{~g} / \mathrm{dL}$ depending on time of day: Morning (until noon), non-fasting:
$<65 \mu \mathrm{~g} / \mathrm{dL}$; Afternoon, non-fasting: $<57 \mu \mathrm{~g} / \mathrm{dL}$.
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {g Includes }}$ those who have completed 10 and more years of school. SLC: School Leaving Certificate

Table 13.2: Mean Serum Zinc and Zinc Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Zinc $\mu \mathrm{g} / \mathrm{dL}^{\text {a }}$ |  | Zinc deficiency serum zinc $<66 \mu \mathrm{~g} / \mathrm{dL}$ or $59 \mu \mathrm{~g} / \mathrm{dL}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 425 | 75.6 | 1.5 | 28.4 | (22.8-34.7) |  |
| Central | 427 | 79.7 | 1.6 | 21.6 | (18.3-25.4) |  |
| Western | 425 | 75.6 | 1.6 | 19.7 | (14.2-26.6) | 0.001 |
| Mid-western | 425 | 77.7 | 1.6 | 26.5 | (22.3-31.2) |  |
| Far-western | 430 | 74.2 | 1.5 | 31.5 | (25.8-37.9) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 355 | 78.0 | 1.6 | 28.5 | (20.2-38.6) |  |
| Hill | 893 | 76.9 | 1.6 | 24.3 | (20.9-28.0) | 0.493 |
| Terai | 884 | 77.3 | 1.5 | 23.9 | (20.8-27.4) |  |
| Location |  |  |  |  |  |  |
| Urban | 294 | 75.7 | 1.5 | 20.0 | (15.8-25.1) | 0.066 |
| Rural | 1,838 | 77.4 | 1.6 | 25.0 | (22.5-27.8) |  |
| Age, years |  |  |  |  |  |  |
| 15-19 | 234 | 78.5 | 1.5 | 23.6 | (17.9-30.5) |  |
| 20-29 | 855 | 79.1 | 1.5 | 21.7 | (18.8-24.8) | 0.057 |
| 30-39 | 669 | 75.4 | 1.6 | 27.6 | (24.0-31.5) |  |
| 40-49 | 374 | 75.4 | 1.6 | 25.1 | (20.2-30.8) |  |
| Lactating Status <br> (among those who had given birth in the last 5 years) |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Yes | 591 | 77.5 | 1.5 | 23.0 | (19.7-26.6) | 019 |
| No | 234 | 73.7 | 1.6 | 30.9 | (25.0-37.4) | 0.019 |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 706 | 73.7 | 1.6 | 28.9 | (25.3-32.9) |  |
| Primary ${ }^{\text {d }}$ | 358 | 77.1 | 1.6 | 24.0 | (19.4-29.3) | 0.006 |
| Some secondary ${ }^{\text {e }}$ | 553 | 79.1 | 1.5 | 22.8 | (19.3-26.9) | 0.006 |
| SLC and above ${ }^{\text {f }}$ | 515 | 79.5 | 1.5 | 20.6 | (17.3-24.4) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 480 | 72.4 | 1.6 | 32.0 | (28.1-36.1) |  |
| Second | 446 | 79.5 | 1.6 | 26.7 | (22.8-31.0) |  |
| Middle | 414 | 75.9 | 1.6 | 24.8 | (19.8-30.5) | 0.001 |
| Fourth | 397 | 79.0 | 1.5 | 20.0 | (16.1-24.6) |  |
| Highest | 395 | 78.0 | 1.5 | 21.1 | (16.3-27.0) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 281 | 79.0 | 1.4 | 20.9 | (16.0-26.9) |  |
| Hill Chhetri | 508 | 78.0 | 1.5 | 24.3 | (20.2-29.1) |  |
| Terai Brahmin/Chhetri | 61 | 70.4 | 1.5 | 27.1 | (13.3-47.2) |  |
| Other Terai caste | 127 | 75.9 | 1.5 | 20.9 | (14.0-30.0) |  |
| Hill Dalit | 263 | 74.5 | 1.6 | 28.6 | (22.0-36.3) | 0.125 |
| Terai Dalit | 91 | 80.1 | 1.6 | 24.5 | (15.8-35.9) | 0.125 |
| Newar | 72 | 83.8 | 1.5 | 17.2 | (10.0-28.0) |  |
| Hill Janajati | 492 | 75.7 | 1.7 | 26.8 | (23.0-30.9) |  |
| Terai Janajati | 198 | 75.2 | 1.5 | 28.4 | (21.8-36.1) |  |
| Muslim | 37 | (92.1) | (1.4) | 12.3 | (5.0-27.1) |  |
| Zinc Supplement during last 7 days |  |  |  |  |  |  |
| Yes | 5 | * | * | * | * |  |
| No | 2,127 | 77.2 | 1.6 | 24.3 | (22.0-26.7) |  |
| Zinc Supplement during last 24 hours |  |  |  |  |  |  |
| Yes | 2 | * | * | * | * |  |
| No | 2,130 | 77.2 | 1.6 | 24.4 | (22.1-26.8) |  |
| Time since last consumed food or beverage |  |  |  |  |  |  |
| >8 hours | 95 | 80.1 | 1.7 | 23.6 | (16.2-32.9) |  |
| 4-8 hours | 269 | 75.2 | 1.5 | 23.7 | (18.6-29.6) | 0.944 |
| $0-<4$ hours | 1,768 | 77.3 | 1.6 | 24.5 | (21.9-27.3) |  |
| Total | 2,132 | 77.2 | 1.6 | 24.3 | (22.1-26.8) |  |

[^43]
## CHAPTER14

## Red Blood Cell

 (RBC) Folate StatusRed Blood Cell (RBC) folate reflects body stores over the last 3 months and is not influenced by recent intake. Serum folate does reflect recent intake and is elevated for several hours after eating or taking a supplement (WHO, 1996). NNMSS-2016 assessed the RBC folate status among children 6-59 months, non-pregnant adolescent girls 10-19 years and non-pregnant women 15-49 years with folate deficiency defined as RBC folate < $226.5 \mathrm{nmol} / \mathrm{L}$, using megaloblastic anemia as a hematological indictor. Risk of folate deficiency was defined as $<305.0 \mathrm{nmol} / \mathrm{L}$. Among adolescent girls and non-pregnant women, RBC folate $<906 \mathrm{nmol} / \mathrm{L}$ was used to assess folate insufficiency for preventing neural tube defects at the population level. When data are not normally distributed, the geometric mean is presented in tables instead of the mean.

### 14.1 Geometric Mean RBC Folate, RBC Folate Deficiency, and Risk of Folate Deficiency among Children 6-59 Months

The RBC folate levels was available for 1,644 children 6-59 months. The geometric mean RBC folate level among children 6-59 months was $642.9 \mathrm{nmol} / \mathrm{L}$ and only one percent had RBC folate deficiency. The prevalence of folate deficiency varied by development region ranging from one percent or less in the Eastern, Central and Mid-western regions to three percent in the Far-western region. RBC folate deficiency among children also varied by maternal education ranging from three percent among those whose mother had no education to 1.3 percent or less in other groups. No other background characteristics were associated with RBC folate deficiency among children 6-59 months (Table 14.1).

Six percent of children 6-59 months had risk of RBC folate deficiency, which varied by ecological region, age, maternal education, wealth quintile and ethnicity. Risk of RBC folate deficiency ranged from two percent in Hill to four percent in Mountain and nine percent in

Terai. By age, it was higher in older age group with seven percent among 24-59 months compared to two percent among 6-23 months. Eleven percent of children whose mother had no education had risk of folate deficiency while it ranges from one to six percent in other maternal education group. Eight percent of children in second and middle wealth quintile suffered from risk of folate deficiency while it ranged from two to six percent in other wealth quintile group. By ethnicity, the prevalence of risk of folic deficiency was highest among other Terai caste group (21 percent) (Table 14.1).

### 14.2 Geometric Mean RBC Folate, RBC Folate Deficiency, Risk of Folate Deficiency, and RBC Folate Insufficiency among Non-Pregnant Adolescent Girls 10-19 Years

The RBC folate level was available for 1,842 non-pregnant adolescent girls 10-19 years and the geometric mean RBC folate level among them was $454.4 \mathrm{nmol} / \mathrm{L}$. About six percent of adolescent girls 10-19 years had RBC folate deficiency. RBC folate deficiency varied by development region, ecological region, and ethnicity. The prevalence of RBC folate deficiency ranged from three percent in the Eastern region to 11 percent in the Far-western region. In the Mountain, Hill and Terai, the prevalence was six percent, four percent and eight percent, respectively. By ethnicity, the prevalence of deficiency was eleven percent or higher among girls from the Other Terai caste group, Hill Dalit and Muslim.

Almost one in six (16 percent) had risk of RBC folate deficiency, which varied by development region, ecological region and ethnicity. Among adolescent girls in the Eastern region, the risk was lower at nine percent but it ranged up to 26 percent in the Far-western region. The proportion of adolescents at risk of RBC folate deficiency was 15 percent in the Mountain, 12 percent in Hill and 20 percent in the Terai. Risk of RBC folate deficiency was 27 percent in the other Terai caste group while it ranged from nine percent to 25 percent among other caste groups.

Nine in ten adolescents ( 96 percent) had RBC folate insufficiency for preventing neural tube defects. RBC folate insufficiency ranged from 94 percent in the Hill to 97 percent in the Terai ecological region. RBC folate insufficiency was higher among those who had not taken any iron-folic acid supplementation in the past 6 months prior to the survey than compared with the adolescents who had taken the supplements (96 percent versus 83 percent) (Table 14.2).

### 14.3 Geometric Mean RBC Folate, RBC Folate Deficiency, Risk of Folate deficiency, and RBC Folate Insufficiency among Non-Pregnant Women 15-49 Years

The RBC folate level was available for 2,136 non-pregnant women 15-49 years and the geometric mean RBC folate level among them was $532.5 \mathrm{nmol} / \mathrm{L}$. About five percent of nonpregnant women had RBC folate deficiency. RBC folate deficiency among non-pregnant women varied by development region, ecological region, age, lactation status, education,
wealth quintile and ethnicity. RBC folate deficiency ranged from eight percent among women in the Far-western region to one percent among women in the Eastern region. Six percent of women each in the Mountain and Terai and three percent in the Hill had RBC folate deficiency. Deficiency ranged from three percent among women 30-39 years of age to 10 percent among those 15-9 years of age. Women who were currently lactating suffered more from this deficiency compared with those who were not lactating (nine percent versus two percent). By level of education, RBC folate deficiency among women ranged from two percent each among Primary and SLC and above level of education group to seven percent among women with no education. Deficiency ranged from six percent among women from the lowest and second wealth quintile to two percent among women from the highest quintile group. By ethnicity, the prevalence of RBC folate deficiency was 14 percent among women from the Other Terai caste group and one percent among women from the Newar caste group.

Almost twelve percent of non-pregnant women had risk of RBC folate deficiency. The risk of deficiency varied by all background characteristics except location. By development region, it ranged from seven percent in the Eastern region to the 20 percent in Far-western region and by ecological region it ranged from eight percent in the Hill to 12 percent in the Mountain and 14 percent in the Terai. Twenty percent of women in the 15-19 years age group had risk of RBC folate deficiency while this prevalence ranged from eight percent to 13 percent in the other age groups. Currently lactating women compared with not lactating had a higher prevalence of risk of folate deficiency ( 17 percent versus six percent). By education the prevalence varied from eight percent among women in the SLC and above level of education to 15 percent among women with no education. By wealth quintile it ranged from seven percent among women in the highest quintile to 16 percent among those in the lowest quintile. Women from other Terai caste group had a 28 percent prevalence of risk of folate deficiency which ranged from four to 24 percent among women in other caste groups.

Nationally, 90 percent of non-pregnant women had RBC folate insufficiency for preventing neural tube defects. This rate varied by development region ranging from 87 percent in the Eastern region to 96 percent in the Far-western region. In Mountain, 88 percent; in Hill, 87 percent; and in Terai, 93 percent suffered from RBC folate insufficiency. Eighty-six percent of women among SLC and above level of education and 91 percent in other groups of education had folate insufficiency. By wealth quintile, the prevalence varied from 85 percent among women from the highest wealth group to 93 percent among women from the middle group. By caste group, 100 percent of women from the Muslim caste had folate insufficiency, while the other groups ranged from 83 to 95 percent (Table 14.3).

## List of Tables

For more information on RBC folate status, see the following tables:

Table 14.1: Mean RBC Folate and Prevalence of Folate Deficiency in Children 6-59 Months
Table 14.2: Mean RBC Folate, Prevalence of Folate Deficiency, and Folate Insufficiency in NonPregnant Adolescent Girls 10-19 Years
Table 14.3: Mean RBC Folate, Prevalence of Folate Deficiency, and Folate Insufficiency in NonPregnant Women 15-49 Years

Table 14.1: Mean RBC Folate and Prevalence of Folate Deficiency in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBC folate nmol/ ${ }^{\text {a }}$ |  | RBC Folate Deficiency $<226.5 \mathrm{nmol} / \mathrm{Ls}^{\text {b }}$ |  |  | Risk of RBC Folate Deficiency $<305.0 \mathrm{nmol} / \mathrm{Ls}^{\text {c }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | $p$-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 323 | 668.5 | 1.5 | 0.2 | (0.0-1.4) |  | 4.3 | (2.1-8.8) |  |
| Central | 341 | 655.8 | 1.6 | 0.4 | (0.1-2.9) |  | 6.9 | (3.4-13.5) |  |
| Western | 277 | 624.5 | 1.6 | 2.1 | (1.0-4.5) | 0.014 | 7.3 | (4.2-12.4) | 0.063 |
| Mid-western | 340 | 621.1 | 1.5 | 1.0 | (0.4-2.5) |  | 2.7 | (1.5-4.7) |  |
| Far-western | 363 | 607.1 | 1.6 | 2.7 | (1.3-5.5) |  | 6.4 | (3.7-10.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 267 | 681.1 | 1.5 | 0.8 | (0.2-3.4) |  | 3.9 | (2.4-6.3) |  |
| Hill | 683 | 701.9 | 1.5 | 0.8 | (0.4-1.6) | 0.638 | 2.2 | (1.5-3.3) | $<0.001$ |
| Terai | 694 | 593.0 | 1.6 | 1.1 | (0.6-2.4) |  | 8.9 | (5.8-13.6) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 207 | 644.2 | 1.5 | 0.7 | (0.2-3.1) | 0.497 | 4.5 | (1.6-11.9) | 0.387 |
| Rural | 1,437 | 642.7 | 1.6 | 1.0 | (0.6-1.7) |  | 5.9 | (4.0-8.7) | . 38 |
| Age, months |  |  |  |  |  |  |  |  |  |
| 6-8 | 65 | 862.4 | 1.5 | 0.0 | - |  | 0.0 | - |  |
| 9-11 | 83 | 837.5 | 1.5 | 0.7 | (0.1-4.7) |  | 0.7 | (0.1-4.7) |  |
| 12-17 | 167 | 722.1 | 1.5 | 0.6 | (0.1-3.9) |  | 1.9 | (0.5-6.1) |  |
| 18-23 | 157 | 629.2 | 1.5 | 0.0 |  | 0.238 | 3.3 | (1.0-10.7) | $<0.001$ |
| 24-35 | 383 | 536.6 | 1.5 | 0.6 | (0.2-1.9) |  | 3.6 | (2.0-6.4) |  |
| 36-47 | 402 | 822.5 | 1.5 | 1.0 | (0.5-2.2) |  | 7.2 | (2.7-17.8) |  |
| 48-59 | 387 | 822.5 | 1.5 | 2.0 | (0.9-4.3) |  | 11.0 | (7.4-16.1) |  |
| 6-23 | 472 | 1025.5 | 1.4 | 0.3 | (0.1-1.3) |  | 1.9 | (0.8-4.3) | <0.001 |
| 24-59 | 1172 | 580.1 | 1.5 | 1.2 | (0.7-2.1) | . 132 | 7.4 | (5.0-10.8) | 0.001 |
| Sex |  |  |  |  |  |  |  |  |  |
| Male | 833 | 579.7 | 1.5 | 1.0 | (0.5-2.0) | 0.846 | 5.4 | (3.7-8.0) | 0.505 |
| Female | 811 | 653.5 | 1.6 | 0.9 | (0.5-1.7) | 源 | 6.1 | (3.8-9.8) | 0.505 |
| Maternal Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 221 | 630.8 | 1.5 | 3.0 | (1.2-6.9) |  | 11.2 | (5.9-20.2) |  |
| Primary ${ }^{\text {d }}$ | 168 | 579.5 | 1.6 | 1.3 | (0.4-4.4) | 0.005 | 6.1 | (3.2-11.3) | <0.001 |
| Some secondarye | 239 | 591.2 | 1.5 | 0.2 | (0.0-1.2) |  | 2.6 | (1.3-5.2) |  |
| SLC and above ${ }^{\text {f }}$ | 221 | 710.8 | 1.5 | 0.1 | (0.0-1.0) |  | 1.4 | (0.4-5.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 462 | 752.6 | 1.5 | 1.3 | (0.6-2.7) |  | 5.6 | (4.0-7.7) |  |
| Second | 341 | 609.3 | 1.5 | 1.2 | (0.3-4.9) |  | 8.1 | (4.5-14.1) |  |
| Middle | 294 | 635.6 | 1.6 | 0.9 | (0.2-3.6) | 0.872 | 7.7 | (4.1-14.0) | 0.003 |
| Fourth | 299 | 634.2 | 1.6 | 0.5 | (0.1-2.0) |  | 5.6 | (2.9-10.8) |  |
| Highest | 248 | 640.7 | 1.5 | 0.9 | (0.3-2.8) |  | 1.7 | (0.7-4.2) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 148 | 704.3 | 1.5 | 0.6 | (0.1-4.1) |  | 1.5 | (0.7-3.2) |  |
| Hill Chhetri | 386 | 728.2 | 1.5 | 1.1 | (0.5-2.8) |  | 2.9 | (1.6-5.2) |  |
| Terai Brahmin/Chhetri | 41 | (692.1) | (1.5) | (0.0) | - |  | (10.8) | (5.1-21.6) |  |
| Other Terai caste | 131 | 570.5 | 1.6 | 2.0 | (0.5-7.3) |  | 21.2 | (15.5-28.4) |  |
| Hill Dalit | 263 | 507.1 | 1.6 | 1.0 | (0.3-3.1) |  | 4.3 | (2.7-6.8) | <0.001 |
| Terai Dalit | 85 | 641.4 | 1.5 | 0.0 | - |  | 3.9 | (1.4-10.3) | <0.001 |
| Newar | 50 | 610.3 | 1.5 | 0.0 | - |  | 0.0 | - |  |
| Hill Janajati | 374 | 816.2 | 1.4 | 0.1 | (0.0-0.8) |  | 1.3 | (0.6-2.9) |  |
| Terai Janajati | 116 | 678.8 | 1.4 | 2.2 | (0.7-6.8) |  | 3.5 | (1.2-9.3) |  |
| Muslim | 48 | (692.5) | (1.6) | (3.4) | (0.8-12.6) |  | (10.2) | (3.2-28.3) |  |
| Baal Vita micronutrient powder intake during 7 days prior to survey |  |  |  |  |  |  |  |  |  |
| Yes | 32 | (459.2) | (1.2) | (0.0) |  |  | (0.0) |  | 0.348 |
| No | 1,612 | 711.8 | 1.4 | 1.0 | (0.6-1.6) |  | 5.9 | (4.1-8.4) | 0.348 |
| Total | 1,644 | 642.9 | 1.5 | 1.0 | (0.6-1.6) |  | 5.8 | (4.0-8.2) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a M M }}$ (crobiological assay; O’Broin S and Kelleher B 1992; Pfeiffer et al 2011. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ WHO, 2012. Deficiency defined as RBC folate $<226.5 \mathrm{nmol} / \mathrm{L}$ using macrocytic anemia as a hematological indicator. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c }}$ WHO, 2012. Risk of Deficiency defined as RBC folate $<305 \mathrm{nmol} / \mathrm{L}$. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {s }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. ${ }^{\mathrm{f}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |


Table 14.2: Mean RBC Folate ${ }^{\text {a }}$, Prevalence of Folate Deficiency, and Folate Insufficiency in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016


[^44]| Characteristics | N | RBC folate nmol/L |  | RBC Folate Deficiency $\mathrm{nmol} / \mathrm{L}<226.5 \mathrm{nmol} / \mathrm{L}^{\mathrm{b}}$ |  |  | Risk of RBC folate deficiency $<305 \mathrm{nmol} / \mathrm{L}^{\text {c }}$ |  |  | RBC folate insufficiency for preventing neural tube defects $<906 \mathrm{nmol} / \mathrm{L}^{\text {d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 425 | 572.7 | 1.6 | 1.8 | (0.6-5.1) |  | 7.0 | (3.6-13.3) |  | 87.3 | (82.2-91.1) |  |
| Central | 428 | 556.1 | 1.6 | 5.2 | (2.8-9.4) |  | 11.4 | (7.6-16.6) |  | 88.4 | (82.7-92.3) |  |
| Western | 427 | 529.3 | 1.5 | 3.6 | (2.4-5.3) | 0.002 | 10.2 | (8.2-12.7) | <0.001 | 88.9 | (86.4-91.0) | 0.002 |
| Mid-western | 426 | 480.8 | 1.6 | 6.4 | (4.1-9.9) |  | 15.4 | (11.2-20.8) |  | 93.3 | (89.2-95.8) |  |
| Far-western | 430 | 443.4 | 1.6 | 8.0 | (5.3-11.8) |  | 20.0 | (14.9-26.3) |  | 95.9 | (92.5-97.8) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 356 | 532.0 | 1.7 | 5.9 | (4.5-7.6) |  | 12.4 | (8.0-18.8) |  | 87.5 | (81.3-91.8) |  |
| Hill | 895 | 566.3 | 1.6 | 2.9 | (2.1-4.0) | 0.007 | 8.0 | (6.7-9.6) | <0.001 | 86.5 | (82.4-89.8) | 0.000 |
| Terai | 885 | 505.2 | 1.6 | 5.8 | (3.8-8.8) |  | 14.4 | (10.9-18.7) |  | 92.5 | (89.6-94.6) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 294 | 558.3 | 1.6 | 2.7 | (1.2-5.6) |  | 11.0 | (7.6-15.5) |  | 88.9 | (83.7-92.6) |  |
| Rural | 1,842 | 528.5 | 1.6 | 4.8 | (3.6-6.5) | 0.108 | 11.6 | (9.2-14.4) | 0.740 | 89.7 | (86.9-91.9) | 0.627 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 234 | 434.1 | 1.6 | 10.4 | (6.4-16.5) |  | 19.6 | (13.8-27.0) |  | 97.0 | (93.9-98.6) |  |
| 20-29 | 857 | 525.3 | 1.6 | 4.1 | (3.0-5.5) | <0.001 | 13.0 | (10.8-15.6) | <0.001 | 91.4 | (87.5-94.2) | <0.001 |
| 30-39 | 671 | 571.2 | 1.6 | 3.3 | (2.0-5.4) |  | 8.3 | (6.4-10.6) | <0.001 | 84.3 | (80.6-87.4) |  |
| 40-49 | 374 | 541.3 | 1.6 | 4.7 | (2.5-8.7) |  | 9.4 | (6.2-14.0) |  | 90.9 | (87.3-93.6) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 592 | 479.9 | 1.6 | 8.5 | (6.0-11.8) |  | 17.1 | (13.8-20.9) | <0.001 | 92.2 | (89.1-94.4) | 0.060 |
| No | 234 | 606.0 | 1.5 | 1.6 | (0.5-5.2) | <0.001 | 5.6 | (3.0-10.2) | <0.001 | 88.0 | (82.2-92.1) | 0.060 |
| Education |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {e }}$ | 708 | 504.2 | 1.6 | 6.7 | (4.4-10.1) |  | 14.5 | (10.7-19.5) |  | 90.6 | (87.5-92.9) |  |
| Primary ${ }^{\text {f }}$ | 360 | 543.2 | 1.5 | 2.2 | (0.9-5.2) |  | 8.9 | (6.4-12.2) |  | 91.3 | (87.2-94.2) |  |
| Some secondary ${ }^{\text {b }}$ | 553 | 518.0 | 1.6 | 6.2 | (4.2-9.0) | <0.001 | 12.7 | (9.5-16.6) | 0.002 | 91.3 | (86.4-94.5) | 0.004 |
| SLC and above ${ }^{\text {b }}$ | 515 | 576.7 | 1.6 | 1.9 | (1.1-3.0) |  | 8.4 | (6.4-10.9) |  | 85.7 | (79.8-90.1) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 480 | 488.5 | 1.6 | 6.3 | (4.6-8.5) |  | 15.6 | (12.3-19.8) |  | 91.6 | (87.9-94.2) |  |
| Second | 447 | 508.2 | 1.6 | 6.1 | (4.1-9.2) |  | 11.6 | (8.3-16.0) |  | 90.8 | (87.4-93.4) |  |
| Middle | 416 | 505.5 | 1.6 | 4.6 | (2.5-8.1 | 0.007 | 12.9 | (9.3-17.6 | 0.002 | 93.2 | (89.6-95.6) | <0.001 |
| Fourth | 398 | 533.1 | 1.6 | 5.2 | (3.0-8.8) |  | 12.4 | (8.7-17.4) |  | 89.3 | (83.5-93.3) |  |
| Highest | 395 | 605.0 | 1.6 | 1.8 | (0.8-4.1) |  | 7.0 | (4.8-10.1) |  | 84.8 | (77.5-89.9) |  |

Table 14.3: Cont'd...

| Characteristics | N | RBC folate nmol/ |  | RBC Folate Deficiency $\mathrm{nmol} / \mathrm{L}<226.5 \mathrm{nmol} / \mathrm{L}^{\mathrm{b}}$ |  |  | Risk of RBC folate deficiency $<305 \mathrm{nmol} / \mathrm{L}^{\mathrm{c}}$ |  |  | RBC folate insufficiency for preventing neural tube defects $<906 \mathbf{n m o l} / \mathrm{L}^{\text {d }}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Ethnicity |  |  |  |  |  |  |  |  | <0.001 |  |  | 0.003 |
| Hill Brahmin | 282 | 582.9 | 1.5 | 2.0 | (0.7-5.5) | $<0.001$ | 6.6 | (4.3-10.0) |  | 86.6 | (80.5-91.1) |  |
| Hill Chhetri | 508 | 570.1 | 1.6 | 3.4 | (2.0-5.7) |  | 7.8 | (5.5-11.1) |  | 87.3 | (81.2-91.7) |  |
| Terai Brahmin/ Chhetri | 61 | 456.6 | 1.6 | 6.5 | (1.9-19.5) |  | 24.3 | (10.0-48.1) |  | 94.8 | (86.3-98.1) |  |
| Other Terai caste | 128 | 418.9 | 1.7 | 14.3 | (7.0-27.0) |  | 27.7 | (14.7-46.1) |  | 94.6 | (90.0-97.2) |  |
| Hill Dalit | 264 | 479.6 | 1.6 | 5.8 | (3.0-11.0) |  | 15.3 | (10.5-21.9) |  | 92.5 | (87.0-95.8) |  |
| Terai Dalit | 91 | 530.7 | 1.6 | 4.7 | (2.1-10.4) |  | 11.9 | (7.7-17.8) |  | 90.9 | (79.0-96.4) |  |
| Newar | 73 | 610.7 | 1.5 | 1.2 | (0.3-4.8) |  | 4.4 | (1.6-11.1) |  | 82.6 | (73.3-89.1) |  |
| Hill Janajati | 492 | 553.2 | 1.5 | 2.8 | (1.9-4.0) |  | 7.0 | (5.3-9.2) |  | 88.9 | (84.8-91.9) |  |
| Terai Janajati | 198 | 541.3 | 1.7 | 3.1 | (1.7-5.8) |  | 12.4 | (7.8-19.1) |  | 90.4 | (85.6-93.7) |  |
| Muslim | 37 | (465.1) | (1.5) | (7.8) | (2.6-21.0) |  | (17.3) | (8.3-32.4) |  | (100.0) | (0.0-100.0) |  |
| Iron and folic acid supplementation in the last 6 months |  |  |  |  |  | 0.652 |  |  | 0.605 |  |  | 0.053 |
| Yes | 87 | 597.8 | 1.8 | 5.6 | (2.9-10.7) |  | 12.9 | (8.2-19.8) |  | 83.1 | (70.3-91.0) |  |
| No | 2,049 | 529.8 | 1.6 | 4.5 | (3.3-6.1) |  | 11.4 | (9.4-13.8) |  | 89.9 | (87.9-91.6) |  |
| Total | 2,136 | 532.5 | 1.6 | 4.5 | (3.4-6.0) |  | 11.5 | (9.5-13.8) |  | 89.6 | (87.3-91.5) |  |

[^45]Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data.
Sample size might vary slightly due to missing data
P-value obtained from Pearson's chi-square test.
P-Malcrobiological assay; O'Broin S and Kelleher B 1992; Pfeiffer et al 2011.
${ }^{\text {b }}$ bHOO, 2012. Deficiency defined as RBC folate $<226.5$ nmol/L using macro

${ }^{\text {d }}$ WHO, 2015. Insufficiency defined as RBC folate $<906 \mathrm{nmol} / \mathrm{L}$.
${ }^{\text {e }}$ Includes those who have never attended school.
IIncludes those who have completed 0-5 years of school.
Includes those who have completed 6-9 years of school.
Includes those who have completed 6-9 years of school.
${ }^{\text {In }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

## CHAPTER 15

## Urinary Iodine Status

This chapter presents the information on iodine deficiency among children 6-9 years and reproductive age women 15-49 years. Population iodine status is based on the median urinary iodine concentration (mUIC) with the cut-off point of a mUIC $<100 \mu \mathrm{~g} / \mathrm{l}$ used to classify suboptimal iodine intake. If the mUIC is $\geq 100 \mu \mathrm{~g} / \mathrm{l}$, the population as a whole is said to be iodine sufficient.

### 15.1 Median Urinary lodine of Children 6-9 Years, Non-pregnant Women and Pregnant Women

Table 15.1 below, reports on the iodine status of children 6-9 years, non-pregnant women 1549 years and pregnant women 15-49 years based on the median urinary iodine concentration (mUIC). Overall, the mUIC of children 6-9 years was $314.1 \mu \mathrm{~g} / \mathrm{L}$. This value was $238.5 \mu \mathrm{~g} / \mathrm{L}$ in Far-western region and $387.9 \mu \mathrm{~g} / \mathrm{L}$ in Central region. The mUIC of children in Mountain was $238.5 \mu \mathrm{~g} / \mathrm{L}$, in Hill it was $294.7 \mu \mathrm{~g} / \mathrm{L}$ and in Terai it was $368.9 \mu \mathrm{~g} / \mathrm{L}$. By location, the mUIC among children in urban area was $341.8 \mu \mathrm{~g} / \mathrm{L}$ and in rural area it was $313.7 \mu \mathrm{~g} / \mathrm{L}$.

The median urinary iodine concentration among non-pregnant women 15-49 years was 286.2 $\mu \mathrm{g} / \mathrm{L}$. This value ranged from $217.7 \mu \mathrm{~g} / \mathrm{L}$ in Far-western region to $309.0 \mu \mathrm{~g} / \mathrm{L}$ in Eastern region. The mUIC of non-pregnant women in was $280.3 \mu \mathrm{~g} / \mathrm{L}$, in Hill it was $241.1 \mu \mathrm{~g} / \mathrm{L}$ and in Terai it was $326.3 \mu \mathrm{~g} / \mathrm{L}$. By location, the mUIC among non-pregnant women in urban area was 307.7 $\mu \mathrm{g} / \mathrm{L}$ and in rural area it was $279.4 \mu \mathrm{~g} / \mathrm{L}$.

The median urinary iodine concentration among pregnant women was $241.3 \mu \mathrm{~g} / \mathrm{L}$. This value ranged from $133.6 \mu \mathrm{~g} / \mathrm{L}$ in Far-western region to $285.4 \mu \mathrm{~g} / \mathrm{L}$ in Central region. The mUIC of pregnant women in Hill was $242.1 \mu \mathrm{~g} / \mathrm{L}$ and in Terai it was $230.5 \mu \mathrm{~g} / \mathrm{L}$. By location, the mUIC among pregnant women in urban area was $273.2 \mu \mathrm{~g} / \mathrm{L}$ and in rural area it was $239.7 \mu \mathrm{~g} / \mathrm{L}$.

As a reflection of iodine status, the mUIC values for children 6-9 years, non-pregnant women and pregnant women were all adequate or above for all development regions, urban/rural, by education and wealth quintile. Only in the Far-western region was mUIC below the recommended $150 \mu \mathrm{~g} / \mathrm{L}$ in Pregnant women. For children 6-9 years, the national mUIC value was above $300 \mu \mathrm{~g} / \mathrm{L}$ (excess).

## List of Tables

For more information on the urinary iodine status, see the following tables:

Table 15.1: Median Urinary Iodine Concentration (UIC) in Children 6-9 Years, Non-Pregnant Women 15-19 Years and Pregnant Women 15-19 Years

Table 15.1: Median Urinary lodine Concentration (UIC) in Children 6-9 Years, Non-Pregnant Women 15-19 Years and Pregnant Women 15-19 Years, Nepal National Micronutrient Status Survey, 2016

| Children 6-9 years |  |  | Non-pregnant Women 15-49 years |  |  | Pregnant Women 15-49 years |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Characteristics | N | Median UIC $\mu \mathrm{g} / \mathrm{L}$ | Characteristics | N | Median UIC $\mu \mathrm{g} / \mathrm{L}$ | Characteristics | N | Median UIC $\mu \mathrm{g} / \mathrm{L}$ |
| Developmental |  |  | Developmental |  |  | Developmental |  |  |
| Region |  |  | Region |  |  | Region |  |  |
| Eastern | 217 | 299.0 | Eastern | 425 | 309.0 | Eastern | 43 | (284.6) |
| Central | 225 | 387.9 | Central | 426 | 279.5 | Central | 44 | (285.4) |
| Western | 204 | 357.7 | Western | 427 | 300.9 | Western | 36 | (239.7) |
| Mid-western | 244 | 239.2 | Mid-western | 422 | 279.0 | Mid-western | 44 | (216.1) |
| Far-western | 244 | 238.5 | Far-western | 429 | 217.7 | Far-western | 36 | (133.6) |
| Ecological Region |  |  | Ecological Region |  |  | Ecological Region |  |  |
| Mountain | 177 | 238.5 | Mountain | 356 | 280.3 | Mountain | 22 | * |
| Hill | 476 | 294.7 | Hill | 894 | 241.1 | Hill | 87 | 242.1 |
| Terai | 481 | 368.9 | Terai | 879 | 326.3 | Terai | 94 | 230.5 |
| Location |  |  | Location |  |  | Location |  |  |
| Urban | 143 | 341.8 | Urban | 294 | 307.7 | Urban | 26 | (273.2) |
| Rural | 991 | 313.7 | Rural | 1,835 | 279.4 | Rural | 177 | 239.7 |
| Wealth Quintile |  |  | Wealth Quintile |  |  | Wealth Quintile |  |  |
| Lowest | 328 | 264.0 | Lowest | 481 | 216.1 | Lowest | 47 | (171.3) |
| Second | 244 | 236.9 | Second | 444 | 256.1 | Second | 41 | (257.1) |
| Middle | 200 | 406.0 | Middle | 413 | 329.9 | Middle | 38 | (315.9) |
| Fourth | 200 | 398.7 | Fourth | 398 | 310.7 | Fourth | 53 | 242.1 |
| Highest | 162 | 321.8 | Highest | 393 | 295.2 | Highest | 24 | * |
| Ethnicity |  |  | Ethnicity |  |  | Age, years |  |  |
| Hill Brahmin | 110 | 263.5 | Hill Brahmin | 282 | 292.3 | 15-19 | 38 | (311.2) |
| Hill Chhetri | 266 | 249.0 | Hill Chhetri | 508 | 232.1 | 20-29 | 138 | 239.7 |
| Terai |  |  | Terai |  |  | 30-39 | 24 | * |
| Brahmin/Chhetri | 30 | (265.7) | Brahmin/Chhetri | 61 | 325.8 | 40-49 | 3 | * |
| Other Terai caste | 79 | 393.0 | Other Terai caste | 126 | 273.7 |  |  |  |
| Hill Dalit | 165 | 313.4 | Hill Dalit | 265 | 326.4 | Education |  |  |
| Terai Dalit | 56 | 395.7 | Terai Dalit | 90 | 230.2 | No education ${ }^{\text {a }}$ | 43 | (184.7) |
| Newar | 30 | (378.6) | Newar | 73 | 330.4 | Primary ${ }^{\text {b }}$ | 41 | (297.7) |
| Hill Janajati | 272 | 360.6 | Hill Janajati | 492 | 259.2 | Some secondary ${ }^{\text {c }}$ | 61 | 242.1 |
| Terai Janajati | 97 | 457.4 | Terai Janajati | 193 | 432.0 | SLC and above ${ }^{\text {d }}$ | 58 | 245.2 |
| Muslim | 28 | (271.7) | Muslim | 37 | (330.8) | Trimester of |  |  |
|  |  |  |  |  |  | Pregnancy (among pregnant women) |  |  |
| Age, years |  |  | Age, years |  |  | First trimester | 57 | 274.6 |
| 6 | 260 | 294.7 | 15-19 | 234 | 325.8 | Second trimester | 73 | 228.2 |
| 7 | 267 | 304.9 | 20-29 | 856 | 284.0 | Third trimester | 73 | 230.5 |
| 8 | 332 | 351.4 | 30-39 | 666 | 282.7 |  |  |  |
| 9 | 275 | 325.7 | 40-49 | 373 | 280.3 |  |  |  |
| Sex |  |  | Education |  |  |  |  |  |
| Male | 556 | 348.7 | No education ${ }^{\text {a }}$ | 703 | 261.5 |  |  |  |
| Female | 578 | 298.6 | Primary ${ }^{\text {b }}$ | 362 | 295.2 |  |  |  |
| Education |  |  | Some secondary ${ }^{\text {c }}$ | 550 | 288.3 |  |  |  |
| No education ${ }^{\text {a }}$ | 29 | (273.4) | SLC and above ${ }^{\text {d }}$ | 514 | 299.1 |  |  |  |
| Primary ${ }^{\text {b }}$ | 1,100 | 314.1 | Lactating Status |  |  |  |  |  |
| Some secondary ${ }^{\text {c }}$ |  |  | (among those who had |  |  |  |  |  |
|  |  |  | given birth in the last 5 |  |  |  |  |  |
|  |  |  | years) |  |  |  |  |  |
|  |  |  | Yes | 591 | 217.5 |  |  |  |
|  |  |  | No | 234 | 284.0 |  |  |  |
| Total | 1,134 | 314.1 | Total | 2,129 | 286.2 | Total | 203 | 241.3 |

[^46]
## CHAPTER16

## Household Purchase of Salt and Consumption of Iodized Salt

This chapter describes the availability of salt in the households on the day of survey and the types of salt used in each household. The salt commonly used for cooking in each household were collected for testing the iodine level and the results for iodine level in each type of salt are reported in this chapter.

### 16.1 Types of Salt Used for Cooking

Table 16.1 shows the types of salt used for cooking or added to foods in households. Approximately nine in ten households (88 percent) reported using refined salt. The proportion of households using refined salt varied by all background characteristics. The households using refined salt ranged from 58 percent in the Far-western region to 98 percent in the Western region and from 54 percent in the Mountain to 96 percent in the Terai. In rural areas, 86 percent and in urban areas 98 percent of households used refined salt. Proportion of households using refined salt significantly increased with increasing household wealth quintile (63 percent among the lowest quintile to nearly 100 percent among the highest quintile). By ethnicity, it varied from 74 percent among the Hill Dalit to 99 percent among the Newar groups.

Crystal salt was used in 12 percent of the households. The proportion of households using crystal salt ranged from five percent in the Western region to 35 percent in the Far-western region, from five percent in the Terai to 24 percent in the Mountain and from two percent in urban areas to 13 percent in rural areas. Households using crystal salt decreased with increasing wealth quintile ( 34 percent among the lowest quintile versus less than one percent in the highest quintile). By ethnicity, 20 percent of households in the Muslim caste group used crystal salt.

Only four percent of the households reported using crushed salt. The proportion of households using crushed salt ranged from none in the Central region to 14 percent in the Far-western region, from one percent in the Terai to 32 percent in the Mountain and from none in urban areas to five percent in rural areas. Similar to crystal salt use, households using crushed salt also decreased with increasing wealth quintile (11 percent in the lowest quintile to less than one percent in the highest quintile). By ethnicity, 12 percent of households of the Hill Dalit caste group reported using crushed salt.

### 16.2 Per-Capita Availability of Salt in the Household

Participants reported the pattern of household purchase of salt, including the usual amount and frequency, for each type used in the household. Among the households ( $\mathrm{N}=4,309$ ), refined salt was used by 3,323 households, crystal salt was used in 756 households and crushed salt was used in 443 households. Nationally, in households with the specified salt, the per-capita availability of refined salt was 11.1 gram per day, crystal salt was 15.4 gram per day and crushed salt was 13.3 gram per day. The per-capita availability of any type of salt in the household was 11.1 gram per day (Table 16.2).

### 16.3 Practice of Washing Crystal Salt

Table 16.3 shows that almost all households ( 96 percent) who used crystal salt had this type of salt in their home on the day of the survey. Among the households who used crystal salt, participants were asked if they wash the salt prior to use and nearly half (46 percent) reported washing the salt before using. The practice of washing crystal salt was more common in the the Western region ( 75 percent) than in the Eastern ( 31 percent) and Far-western region (32 percent). The practice of washing crystal salt before use was 36 percent in the Mountain, 41 percent in Hill and 66 percent in the Terai. This practice ranged from 39 percent in the lowest wealth quintile group to 65 percent in the middle wealth quintile group.

### 16.4 Observation of Crystal Salt and Package Label

Among the households who reported using crystal salt and reported having the salt available in the home, almost all ( 99 percent) could show the salt on the day of the survey. Based on enumerator observation, 15 percent of the available crystal salt were in original packaging, and among them, 9 percent had a label stating the salt was iodized (Table 16.4).

### 16.5 Availability of Refined Salt and Observation of the Salt

Among the households who reported using refined salt, 97 percent reported they had salt on the day of survey. Among those having salt available, almost all (99.8 percent) could show the salt on the day of the survey. Based on enumerator observation, four in ten households had the salt in the original packaging (Table 16.5).

Table 16.6 shows that among the refined salt samples observed in the original packaging, over eight in ten ( 88 percent) households used a national brand of refined salt while 12 percent used an Indian brand. Eighty-nine percent of the refined salt samples in the original packaging had the two-child logo and almost all (99 percent) packaging stated the salt was iodized (Table 16.6).

### 16.6 Availability of Crushed Salt and Observation of the Salt

Among the households who reported using crushed salt, 97 percent reported that they have this type of salt available in home. Enumerators observed the salt in 100 percent of households who reported having the crushed salt. Based on observation, more than half ( 63 percent) of households had the salt in the original packaging (Table 16.7).

Table 16.8 shows among the crushed salt samples observed in the original packaging, over nine in ten ( 98 percent) households used a national brand of crushed salt while two percent used an Indian brand. Ninety-seven percent of the packages had the two-child logo on the packaging and almost all (99 percent) packaging stated the salt was iodized.

### 16.7 Iodine Levels in All Salt Sample

Salt samples were collected from 2109 households to measure the iodine content. Among all salt samples, the mean iodine level was $44.2 \mathrm{mg} / \mathrm{kg}$ (ppm) (Table 16.9). Approximately, nine in ten salt samples ( 91 percent) had an iodine level equal to or more than 15 ppm while almost four percent of the salt was not iodized (less than 5 ppm of iodine level). Over two in ten (23 percent) salt samples had an adequate iodine level ( $15-40 \mathrm{ppm}$ ) and over two thirds ( 68 percent) had excessive iodine levels ( $>40 \mathrm{ppm}$ ). Six percent of salt samples had iodine levels between 5 to $<15 \mathrm{ppm}$. The proportion of households having "not iodized" salt was higher in the Midwestern region (11 percent) and it varied from less than one percent in Western region to three percent in the other three regions. The proportion of households having salt with no iodine was two percent, five percent and three percent in the Mountain, Hill and Terai, respectively. Households having salt with no iodine varied by household wealth quintile ranging from 10 percent in the lowest quintile to one percent in the fourth and highest quintile.

### 16.8 Iodine Levels in Crystal Salt Sample

Among the crystal salt samples tested, the mean iodine level measured was $16.3 \mathrm{mg} / \mathrm{kg}$ (ppm) (Table 16.10). Four in ten crystal salt samples tested ( 46 percent) had iodine levels equal to or more than 15 ppm while 23 percent of the salt tested was not iodized (less than 5 ppm of iodine level). About one-third of the crystal salt samples ( 39 percent) had an adequate iodine level (1540 ppm ) and eight percent had excessive iodine levels ( $>40 \mathrm{ppm}$ ). Another one third (31 percent) of salt samples had an iodine level between 5 to $<15 \mathrm{ppm}$. The proportion of households having no iodine in crystal salt ranged from eight percent in the Far-western region to 40 percent in the Mid-western region.

### 16.9 Iodine Levels in Refined Salt Sample

Among the refined salt samples tested for iodine content, the mean iodine level was $48.2 \mathrm{mg} / \mathrm{kg}$ (ppm) (Table 16.11). Overall, 97 percent of refined salt samples had iodine levels equal to or more than 15 ppm while around one percent of the salt tested was not iodized (less than 5 ppm of iodine level). Two in ten ( 22 percent) of the refined salt samples had an adequate iodine level (15-40 ppm) and over two-thirds (76 percent) had excessive iodine levels ( $>40 \mathrm{ppm}$ ). Two percent of the refined salt samples had an iodine content of $5<15 \mathrm{ppm}$.

### 16.10 Iodine Levels in Crushed Salt Sample

Among crushed salt samples tested for their iodine content, the mean iodine level was 45.3 $\mathrm{mg} / \mathrm{kg}$ (ppm) (Table 16.12). Overall, 98 percent of crushed salt samples had an iodine level of equal to or more than 15 ppm while one crushed salt sample tested was not iodized (less than 5 ppm of iodine level) and four samples had iodine values between $5<15 \mathrm{ppm}$ (data not shown for $<5 \mathrm{ppm}$ or $5<15 \mathrm{ppm}$ ). Forty-six percent had an adequate iodine level (15-40 ppm) and over half (52 percent) had excessive iodine levels ( $>40 \mathrm{ppm}$ ).

## List of Tables

For more information on the household purchase of salt and consumption of iodized salt, see the following tables:

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Table 16.1: Salt Used by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Salt types used for cooking or to put in food ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Crystal salt (phoda) |  |  | Refined salt |  |  | Crushed salt |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | $p$-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 8.9 | (6.8-11.6) |  | 87.1 | (84.1-89.6) |  | 6.9 | (5.1-9.2) |  |
| Central | 862 | 6.5 | (5.5-7.7) |  | 96.1 | (95.6-96.6) |  | 0.0 | - |  |
| Western | 859 | 4.7 | (3.3-6.7) | <0.001 | 97.9 | (96.2-98.8) | $<0.001$ | 0.4 | (0.3-0.8) | $<0.001$ |
| Mid-western | 862 | 27.5 | (18.8-38.4) |  | 69.9 | (60.5-77.9) |  | 9.3 | (5.4-15.5) |  |
| Far-western | 862 | 34.6 | (26.9-43.1) |  | 58.3 | (49.4-66.6) |  | 13.8 | (10.4-18.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 24.1 | (15.6-35.3) |  | 53.9 | (46.7-60.9) |  | 31.9 | (26.8-37.5) |  |
| Hill | 1,794 | 16.8 | (13.9-20.0) | $<0.001$ | 84.4 | (81.1-87.2) | <0.001 | 3.4 | (2.2-5.2) | <0.001 |
| Terai | 1,796 | 5.4 | (3.9-7.4) |  | 95.7 | (93.9-97.0) |  | 0.7 | (0.2-2.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 2.4 | (0.5-10.8) | <0 | 97.9 | (90.1-99.6) | <0.001 | 0.0 | - |  |
| Rural | 3,711 | 13.4 | (11.4-15.7) | <0.001 | 86.0 | (83.7-88.0) | <0.001 | 4.8 | (3.8-6.0) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 34.2 | (28.7-40.2) |  | 62.6 | (56.6-68.2) |  | 10.7 | (7.5-15.0) |  |
| Second | 902 | 16.6 | (13.9-19.6) |  | 83.9 | (81.2-86.3) |  | 5.7 | (4.7-6.9) |  |
| Middle | 813 | 6.0 | (4.6-7.9) | $<0.001$ | 94.1 | (92.5-95.4) | $<0.001$ | 2.8 | (1.8-4.3) | $<0.001$ |
| Fourth | 789 | 1.9 | (1.2-3.2) |  | 98.0 | (96.5-98.8) |  | 1.2 | (0.6-2.7) |  |
| Highest | 650 | 0.5 | (0.3-1.0) |  | 99.6 | (99.2-99.8) |  | 0.2 | (0.0-1.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 8.1 | (4.7-13.6) |  | 91.4 | (86.4-94.6) |  | 2.6 | (1.1-5.6) |  |
| Hill Chhetri | 1,045 | 17.5 | (13.6-22.3) |  | 80.2 | (74.7-84.7) |  | 7.6 | (5.0-11.5) |  |
| Terai Brahmin/Chhetri | 111 | 2.9 | (1.2-7.1) |  | 94.7 | (85.3-98.2) |  | 2.4 | (0.3-16.1) |  |
| Other Terai caste | 291 | 2.7 | (0.5-12.1) |  | 97.6 | (89.1-99.5) |  | 0.0 | - |  |
| Hill Dalit | 510 | 18.0 | (13.1-24.1) | <0.001 | 74.2 | (65.5-81.3) | <0.001 | 12.3 | (6.5-22.1) | <0.001 |
| Terai Dalit | 183 | 4.5 | (2.0-10.1) | <0.001 | 97.3 | (92.5-99.0) | <0.001 | 0.6 | (0.1-4.4) | <0.001 |
| Newar | 152 | 0.9 | (0.3-2.6) |  | 99.4 | (97.7-99.9) |  | 0.0 | - |  |
| Hill Janajati | 1,027 | 17.3 | (14.5-20.6) |  | 84.3 | (81.3-87.0) |  | 4.7 | (3.7-6.0) |  |
| Terai Janajati | 354 | 7.5 | (4.0-13.5) |  | 94.3 | (89.5-97.0) |  | 0.2 | (0.0-1.7) |  |
| Muslim | 80 | 19.9 | (6.9-45.7) |  | 80.9 | (54.3-93.8) |  | 1.1 | (0.1-7.6) |  |
| Total | 4,309 | 11.9 | (10.3-13.7) |  | 87.6 | (85.9-89.2) |  | 4.1 | (3.3-5.1) |  |

[^47]Table 16.2: Estimated Per-capita Daily Availability of Salt by Type in the Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Per-capita availability of salt in the housheold ${ }^{\text {a,b }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Crystal salt (phoda) |  | Refined salt |  | Crushed salt |  | Any type of salt |  |
|  | N | Median g/day | N | Median g/day | N | Median g/day | N | Median g/day |
| Development Region |  |  |  |  |  |  |  |  |
| Eastern | 128 | 16.7 | 676 | 13.3 | 102 | 13.9 | 864 | 13.3 |
| Central | 54 | 13.9 | 833 | 11.1 | 0 | * | 862 | 11.1 |
| Western | 44 | (11.1) | 744 | 11.1 | 106 | 25.0 | 859 | 11.1 |
| Mid-western | 227 | 13.3 | 574 | 11.1 | 116 | 13.3 | 862 | 13.3 |
| Far-western | 303 | 16.7 | 496 | 12.5 | 119 | 12.5 | 862 | 13.9 |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 161 | 15.4 | 318 | 11.1 | 314 | 13.3 | 719 | 12.5 |
| Hill | 425 | 15.4 | 1,340 | 11.1 | 120 | 11.9 | 1,794 | 11.1 |
| Terai | 170 | 13.9 | 1,665 | 11.1 | 9 | * | 1,796 | 11.6 |
| Location |  |  |  |  |  |  |  |  |
| Urban | 29 | (20.8) | 573 | 11.1 | 0 | * | 598 | 11.1 |
| Rural | 727 | 14.3 | 2,750 | 11.1 | 443 | 13.3 | 3,711 | 12.5 |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 455 | 16.7 | 580 | 11.1 | 208 | 12.5 | 1,155 | 13.3 |
| Second | 187 | 13.3 | 674 | 11.1 | 108 | 13.3 | 902 | 13.3 |
| Middle | 81 | 13.9 | 695 | 11.1 | 73 | 13.9 | 813 | 11.1 |
| Fourth | 25 | (10.4) | 732 | 11.1 | 50 | 16.7 | 789 | 11.8 |
| Highest | 8 |  | 642 | 11.1 | 4 | * | 650 | 11.1 |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 65 | 16.7 | 470 | 11.1 | 33 | (13.6) | 551 | 11.1 |
| Hill Chhetri | 263 | 16.7 | 703 | 11.1 | 147 | 13.3 | 1,045 | 12.5 |
| Terai Brahmin/Chhetri | 7 | * | 102 | 13.3 | 2 | * | 111 | 13.3 |
| Other Terai caste | 22 | * | 271 | 11.9 | 0 | * | 291 | 12.5 |
| Hill Dalit | 115 | 13.9 | 325 | 11.1 | 92 | 11.1 | 510 | 12.5 |
| Terai Dalit | 19 | * | 171 | 13.3 | 1 | * | 183 | 13.3 |
| Newar | 3 | * | 150 | 11.1 | 0 | * | 152 | 11.1 |
| Hill Janajati | 198 | 13.3 | 745 | 11.1 | 166 | 15.8 | 1,027 | 11.1 |
| Terai Janajati | 38 | (13.9) | 325 | 11.1 | 1 | * | 354 | 11.1 |
| Muslim | 24 | * | 57 | 11.1 | 1 | * | 80 | 11.4 |
| Total | 756 | 15.4 | 3,323 | 11.1 | 443 | 13.3 | 4,309 | 11.1 |
| Note: N unweighted. All estimates account for weighting and complex sample <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> ${ }^{\text {a }}$ Asked for each type of salt used in households. <br> ${ }^{\text {b }}$ Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household members. |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Table 16.3: Washing Crystal Salt (Phoda) and Availability of Salt the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Crystal salt (phoda) ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Wash before use |  |  | Reported have salt on day of the survey |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 128 | 31.2 | (16.2-51.5) |  | 96.3 | (93.0-98.1) |  |
| Central | 54 | 55.1 | (51.2-59.0) |  | 94.9 | (89.5-97.6) |  |
| Western | 44 | (74.8) | (62.8-84.0) | $<0.001$ | (96.0) | (94.3-97.2) | 0.751 |
| Mid-western | 227 | 52.5 | (43.9-60.9) |  | 95.0 | (92.3-96.8) |  |
| Far-western | 303 | 31.6 | (25.7-38.3) |  | 97.9 | (95.8-99.0) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 161 | 36.0 | (22.1-52.8) |  | 95.3 | (90.2-97.8) |  |
| Hill | 425 | 41.2 | (35.9-46.6) | $<0.001$ | 97.0 | (96.3-97.6) | 0.299 |
| Terai | 170 | 65.7 | (56.3-74.0) |  | 93.6 | (88.0-96.6) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 29 | (58.1) | (31.3-80.9) | 0383 | (97.5) | (78.2-99.8) | 0.444 |
| Rural | 727 | 45.4 | (40.6-50.3) | 383 | 96.0 | (94.6-97.0) | 0.444 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 455 | 38.5 | (32.6-44.7) |  | 97.3 | (95.9-98.2) |  |
| Second | 187 | 52.8 | (45.5-60.1) |  | 96.5 | (94.7-97.7) |  |
| Middle | 81 | 64.6 | (53.8-74.0) | 0.001 | 90.7 | (79.0-96.2) | 0.038 |
| Fourth | 25 | (54.9) | (30.3-77.3) |  | (88.9) | (70.5-96.4) |  |
| Highest | 8 | * | * |  | * | * |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 65 | 46.6 | (31.0-62.9) |  | 97.7 | (89.9-99.5) |  |
| Hill Chhetri | 263 | 42.6 | (33.5-52.1) |  | 99.6 | (97.5-100.0) |  |
| Terai Brahmin/Chhetri | 7 | * | * |  | * | * |  |
| Other Terai caste | 22 | * | * |  | * | * |  |
| Hill Dalit | 115 | 52.9 | (40.2-65.2) | 0.015 | 90.1 | (81.0-95.1) | 0.220 |
| Terai Dalit | 19 | * | * | 0.015 | * | * | 0.220 |
| Newar | 3 | * | * |  | * | * |  |
| Hill Janajati | 198 | 36.2 | (29.7-43.2) |  | 94.5 | (92.5-96.0) |  |
| Terai Janajati | 38 | (68.7) | (53.6-80.6) |  | (95.7) | (82.4-99.1) |  |
| Muslim | 24 | * | * |  | * | * |  |
|  | 756 | 45.7 | (41.0-50.5) |  | 96.0 | (94.7-97.0) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a}}$ Among those who reported household uses salt type.

Table 16.4: Observation of Crystal Salt and its Label, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Crystal salt (phoda) ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Salt observed ${ }^{\text {b }}$ |  |  | In original packaging ${ }^{\text {c }}$ |  |  | Label says iodized Written ${ }^{\text {c }}$ |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 123 | 100.0 | - |  |  | (12.1-24.0) |  | 20.5 | (6.0-50.9) |  |
| Central | 51 | 100.0 | - |  | 34.5 | (29.7-39.6) |  | 0.0 |  |  |
| Western | 42 | (92.0) | (67.4-98.5) | 0.003 | (7.0) | (3.2-14.3) | <0.001 | (0.0) |  | 0.013 |
| Mid-western | 215 | 98.5 | (93.5-99.7) |  |  | (1.9-7.7) |  | 41.5 | (12.7-77.5) |  |
| Far-western | 297 | 98.9 | (96.6-99.7) |  | 15.7 | (9.4-25.0) |  | 6.6 | (2.2-18.6) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 153 | 99.3 | (94.8-99.9) |  | 17.7 | (9.6-30.3) |  | 4.1 | (0.5-25.2) |  |
| Hill | 415 | 99.1 | (96.6-99.8) | 0.175 |  | (12.0-18.7) | 0.872 | 3.3 | (1.0-10.1) | 0.002 |
| Terai | 160 | 96.8 | (89.9-99.1) |  | 14.9 | (9.6-22.2) |  | 31.8 | (12.1-61.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 28 | (100.0) | - | 06 | (13.3) | (9.9-17.6) | 0.916 | (53.6) | (26.2-79.1) | 0.045 |
| Rural | 700 | 98.6 | (96.7-99.4) | 0.648 | 15.4 | (12.6-18.7) | 0.916 | 8.0 | (3.4-17.6) | 0.045 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 443 | 99.7 | (98.0-100.0) |  |  | (11.2-17.6) |  | 4.4 | (1.7-10.9) |  |
| Second | 182 | 97.2 | (91.0-99.1) |  |  | (12.3-23.3) |  | 5.2 | (1.2-19.3) |  |
| Middle | 75 | 98.9 | (92.8-99.9) | 0.042 |  | (13.8-32.4) | 0.419 | 37.9 | (15.6-67.0) | 0.002 |
| Fourth | 21 | * |  |  | * | * |  | * | * |  |
| Highest | 7 | * | * |  | * | * |  | * | * |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 63 | 100.0 | - |  |  | (10.5-38.1) |  | 24.2 | (5.2-64.8) |  |
| Hill Chhetri | 262 | 99.7 | (98.1-100.0) |  | 14.7 | (9.5-22.1) |  | 3.5 | (1.0-12.0) |  |
| Terai |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 7 | * |  |  | * |  |  | * | * |  |
| Other Terai caste | 22 | * | * |  | * | * |  | * | * |  |
| Hill Dalit | 106 | 94.5 | (83.7-98.3) | 0.021 | 4.2 | (1.6-11.0) | 0.124 | 35.1 | (5.4-83.7) | 0.079 |
| Terai Dalit | 18 | * |  |  | * | * |  | * | * |  |
| Newar | 3 | * | * |  | * |  |  | * | * |  |
| Hill Janajati | 186 |  | (93.5-99.9) |  |  | (15.4-23.7) |  | 2.1 | (0.3-13.5) |  |
| Terai Janajati | 36 | (100.0) | - |  | (19.3) | (10.4-32.9) |  | (26.0) | (7.5-60.3) |  |
| Muslim | 23 | * | * |  | * | * |  | * | * |  |
| Total | 728 | 98.7 | (96.8-99.4) |  | 15.4 | (12.6-18.6) |  | 9.1 | (4.2-18.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who reported household uses salt type. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Among those who reported they had salt the day of the survey. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c }}$ Among those with observed salt in the original packaging. |  |  |  |  |  |  |  |  |  |  |

Table 16.5: Availability of Refined Salt on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Refined salt ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Reported have salt on day of the survey |  |  | N | Salt observed ${ }^{\text {b }}$ |  |  | N | In original packaging ${ }^{\text {b,c }}$ |  |  |
|  |  | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |  | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |  | \% | (95\% CI) | pvalue |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 676 | 98.1 | (97.2-98.7) |  | 653 | 99.8 | (99.4-99.9) |  | 650 | 45.3 | (39.4-51.4) |  |
| Central | 833 | 97.5 | (96.7-98.0) |  | 809 | 100.0 | - |  | 809 | 41.7 | (36.3-47.3) |  |
| Western | 744 | 97.6 | (96.5-98.4) | 0.001 | 729 | 99.4 | (98.5-99.8) | 0.033 | 725 | 31.7 | (29.2-34.2) | $<0.001$ |
| Mid-western | 574 | 95.1 | (90.7-97.5) |  | 547 | 100.0 | - |  | 547 | 30.9 | (26.4-35.7) |  |
| Far-western | 496 | 93.9 | (91.6-95.7) |  | 466 | 99.6 | (98.5-99.9) |  | 464 | 45.3 | (37.7-53.1) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 318 | 89.1 | (83.2-93.0) |  | 287 | 99.7 | (97.6-100.0) |  | 286 | 47.5 | (42.5-52.5) |  |
| Hill | 1,340 | 96.4 | (95.7-97.0) | $<0.001$ | 1,285 | 99.8 | (99.4-99.9) | 0.701 | 1,280 | 39.8 | (36.2-43.5) | 0.119 |
| Terai | 1,665 | 98.6 | (97.6-99.1) |  | 1,632 | 99.8 | (99.5-99.9) |  | 1,629 | 38.6 | (34.5-42.9) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 573 | 99.2 | (97.9-99.7) |  | 568 | 100.0 | - |  | 568 | 31.9 | (26.6-37.6) |  |
| Rural | 2,750 | 96.8 | (96.1-97.4) | . 002 | 2,636 | 99.8 | (99.5-99.9) | 20 | 2,627 | 40.9 | (37.8-44.0) | 0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 580 | 91.8 | (89.0-93.9) |  | 532 | 99.4 | (98.7-99.7) |  | 527 | 39.8 | (36.1-43.6) |  |
| Second | 674 | 94.9 | (93.1-96.2) |  | 632 | 99.9 | (99.9-99.9) |  | 631 | 42.5 | (37.3-47.8) |  |
| Middle | 695 | 98.0 | (96.8-98.8) | $<0.001$ | 675 | 100.0 |  | 0.044 | 675 | 42.7 | (39.1-46.3) | 0.016 |
| Fourth | 732 | 99.3 | (98.0-99.7) |  | 726 | 99.5 | (98.5-99.9) |  | 723 | 35.9 | (31.0-41.2) |  |
| Highest | 642 | 99.8 | (99.2-99.9) |  | 639 | 100.0 | - |  | 639 | 37.3 | (31.3-43.7) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 470 | 98.7 | (97.8-99.3) |  | 461 | 100.0 | - |  | 461 | 42.6 | (37.2-48.2) |  |
| Hill Chhetri | 703 | 96.5 | (95.2-97.5) |  | 667 | 99.6 | (98.6-99.9) |  | 664 | 37.0 | (33.5-40.7) |  |
| Terai Brahmin/Chhetri | 102 | 99.0 | (95.4-99.8) |  | 100 | 100.0 | - |  | 100 | 46.1 | (32.7-60.1) |  |
| Other Terai Caste | 271 | 99.2 | (96.6-99.8) |  | 268 | 100.0 | - |  | 268 | 47.9 | (37.8-58.1) |  |
| Hill Dalit | 325 | 95.4 | (91.4-97.6) | <0.001 | 310 | 99.4 | (96.0-99.9) | 0.353 | 309 | 28.8 | (22.8-35.7) | <0.001 |
| Terai Dalit | 171 | 97.5 | (94.1-99.0) |  | 165 | 99.6 | (97.3-100.0) |  | 164 | 50.5 | (41.0-60.0) |  |
| Newar | 150 | 99.7 | (97.9-100.0) |  | 149 | 100.0 | - |  | 149 | 35.4 | (26.3-45.7) |  |
| Hill Janajati | 745 | 94.6 | (93.4-95.7) |  | 704 | 99.7 | (99.4-99.9) |  | 701 | 34.9 | (32.2-37.7) |  |
| Terai Janajati | 325 | 99.1 | (97.2-99.7) |  | 321 | 100.0 | - |  | 321 | 42.9 | (34.8-51.4) |  |
| Muslim | 57 | 98.7 | (91.1-99.8) |  | 56 | 98.6 | (89.5-99.8) |  | 55 | 23.9 | (13.7-38.2) |  |
| Total | 3,323 | 97.2 | (96.6-97.7) |  | 3,204 | 99.8 | (99.6-99.9) |  | 3,195 | 39.5 | (36.8-42.2) |  |

[^48]Table 16.6: Refined Salt and Availability of Salt the Day of the Survey, Nepal National Micronutrient Status Survey, 2016


Table 16.7: Availability of Crushed Salt on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Crushed salt ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have salt on day of the survey |  |  |  | Salt observed ${ }^{\text {b }}$ |  |  |  | In original packaging, ${ }^{\text {b }}$ |  |  |  |
|  | N | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | N | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | N | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 102 | 91.2 | (84.3-95.2) |  | 93 | 100.0 | - |  | 93 | 60.2 | (50.7-69.0) |  |
| Central | 0 | * | * |  | 8 | * | * |  | 0 | * | * |  |
| Western | 106 | 100.0 | - | 0.003 | 106 | 100.0 | - | - | 106 | 91.5 | (80.2-96.6) | $<0.001$ |
| Mid-western | 116 | 96.6 | (72.7-99.7) |  | 112 | 100.0 | - |  | 112 | 65.2 | (50.8-77.2) |  |
| Far-western | 119 | 98.3 | (94.2-99.5) |  | 117 | 100.0 | - |  | 117 | 35.9 | (27.0-45.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 314 | 96.8 | (91.2-98.9) |  | 304 | 100.0 | - |  | 304 |  | (74.0-80.9) |  |
| Hill | 120 | 97.5 | (92.7-99.2) | 0.708 | 117 | 100.0 | - | - | 117 | 26.5 | (17.3-38.4) | $<0.001$ |
| Terai | 9 | * | * |  | 7 | * | * |  | 7 | * | * |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 0 | * | * |  | 0 | * | * |  | 0 | * | * |  |
| Rural | 443 | 96.6 | (93.0-98.4) |  | 428 | 100.0 | - |  | 428 | 62.6 | (56.7-68.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 162 | 95.7 | (84.2-98.9) |  | 200 | 100.0 | - |  | 200 | 53.5 | (40.9-65.8) |  |
| Second | 119 | 97.5 | (92.5-99.2) |  | 105 | 100.0 | - |  | 105 | 57.8 | (50.7-64.5) |  |
| Middle | 85 | 95.3 | (85.5-98.6) | 0.314 | 70 | 100.0 | - | - | 70 | 70.4 | (61.4-78.0) | $<0.001$ |
| Fourth | 65 | 0.0 | - |  | 50 | 100.0 | - |  | 50 | 84.6 | (70.0-92.8) |  |
| Highest | 12 | * | * |  | 3 | * | * |  | 3 | * | * |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 33 | (100.0) | - |  |  | (100.0) | - |  | 33 | (57.6) | (33.6-78.4) |  |
| Hill Chhetri | 147 | 97.3 | (92.1-99.1) |  | 143 | 100.0 | - |  | 143 | 53.1 | (40.7-65.2) |  |
| Terai |  |  |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 2 | * | * |  | 2 | * | * |  | 2 | * | * |  |
| Hill Dalit | 92 | 94.6 | (78.9-98.8) | 0.439 | 87 | 100.0 | - | - | 87 | 52.9 | (36.7-68.5) | <0.001 |
| Terai Dalit | 1 | * | * |  | 0 | * | * |  | 0 | * | * |  |
| Hill Janajati |  | 97.0 | (92.2-98.9) |  | 161 | 100.0 | - |  | 161 | 78.9 | (72.5-84.1) |  |
| Terai Janajati | 1 | * | * |  | 1 | * | * |  | 1 | * | * |  |
| Muslim | 1 | * | * |  | 1 | * | * |  | 1 | * | * |  |
| Total | 443 | 96.6 | (93.0-98.4) |  | 428 | 100.0 | (100.0-100.0) |  | 428 | 62.6 | (56.7-68.2) |  |

[^49]Table 16.8: Crushed Salt and Availability of Salt the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Crushed salt ${ }^{\text {a,b,c }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Brand |  |  |  | Two logo child observed ${ }^{\text {b,c }}$ |  | Label says iodized ${ }^{\text {b }}$, |  |
|  |  | National |  | India |  |  |  |  |  |
|  |  | \% | \% (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |
| Eastern | 56 | 91.1 | (75.0-97.2) | 8.9 | (2.8-25.0) | 85.7 | (72.1-93.3) | 98.2 | (97.6-98.7) |
| Central | 0 | * | * | * | * | * | * | * | * |
| Western | 97 | 100.0 | - | 0.0 | - | 100.0 | - | 100.0 | - |
| Mid-western | 73 | 100.0 | - | 0.0 | - | 100.0 | - | 100.0 | - |
| Far-western | 42 | (100.0) | - | (0.0) | - | (97.6) | (84.3-99.7) | (97.6) | (84.3-99.7) |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 236 | 100.0 | - | 0.0 | - | 99.6 | (97.0-99.9) | 99.6 | (97.0-99.9) |
| Hill | 31 | (83.9) | (56.7-95.4) | (16.1) | (4.6-43.3) | (77.4) | (52.4-91.5) | (96.8) | (94.1-98.3) |
| Terai | 1 | * | * | * | * | * | * | * | * |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 0 | * | * | * | * | * | * | * | * |
| Rural | 268 | 98.1 | (94.0-99.4) | 1.9 | (0.6-6.0) | 96.6 | (93.1-98.4) | 99.3 | (98.0-99.7) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 83 | 100.0 | - | 0.0 | - | 98.8 | (98.2-99.2) | 100.0 | - |
| Second | 67 | 95.5 | (91.4-97.7) | 4.5 | (2.3-8.6) | 94.0 | (90.2-96.4) | 98.5 | (98.2-98.8) |
| Middle | 57 | 96.5 | (78.6-99.5) | 3.5 | (0.5-21.4) | 96.5 | (78.6-99.5) | 100.0 | - |
| Fourth | 55 | 100.0 | (0.0-100.0) | 0.0 | - | 96.4 | (86.3-99.1) | 98.2 | (87.9-99.8) |
| Highest | 6 | * | * | * | * | * | * | * | * |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 19 | * | * | * | * | * | * | * | * |
| Hill Chhetri | 76 | 100.0 | - | 0.0 | - | 97.4 | (89.2-99.4) | 98.7 | (90.6-99.8) |
| Hill Dalit | 46 | (97.8) | (84.9-99.7) | (2.2) | (0.3-15.1) | (93.5) | (84.9-97.3) | (97.8) | (96.0-98.8) |
| Hill Janajati | 127 | 96.9 | (91.6-98.9) | 3.1 | (1.1-8.4) | 96.9 | (91.6-98.9) | 100.0 | - |
| Total | 268 | 98.1 | (94.0-99.4) | 1.9 | (0.6-6.0) | 96.6 | (93.1-98.4) | 99.3 | (98.0-99.7) |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Significant test did not perform due to small sample size.
${ }^{\text {a }}$ Among those who reported household uses of crushed salt
${ }^{\mathrm{b}}$ Among those who reported they had salt the day of the survey
${ }^{c}$ Among those with observed salt in the original packaging
Table 16.9: Level of lodization among All Salt Samples Collected, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | All salt samples |  | All Salt Samples Iodized mg/kg, $\mathrm{ppm}^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Not iodized<5 |  |  |  |  |  |  |  | Iodize | ppm |  |  |  |  |  |
|  |  |  |  | 5 to <15 | $\geq 15^{\text {b }}$ |  |  | $\geq 15$ to $40{ }^{\text {c }}$ |  |  | >40 |  |  |
|  |  | Mean | Standard Error |  |  |  | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p}^{-} \\ \text {value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p}^{-} \\ \text {value } \\ \hline \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 426 | 45.4 | 0.8 | 2.9 | (1.2-6.6) |  | 5.2 | (2.1-12.2) |  | 91.9 | (84.6-95.9) |  | 22.5 | (18.6-26.9) |  | 69.4 | (61.4-76.4) |  |
| Central | 419 | 44.0 | 0.6 | 2.8 | (2.0-4.0) |  | 4.9 | (3.3-7.3) |  | 92.3 | (90.0-94.1) |  | 21.1 | (16.4-26.6) |  | 71.2 | (65.6-76.2) |  |
| Western | 425 | 50.0 | 0.9 | 0.6 | (0.3-1.2) | <0.001 | 4.2 | (2.2-8.0) | 0.006 | 95.2 | (91.5-97.3) | <0.001 | 18.8 | (13.7-25.4) | <0.001 | 76.4 | (68.5-82.7) | <0.001 |
| Mid-western | 421 | 38.2 | 1.3 | 10.9 | (6.7-17.3) |  | 8.9 | (6.0-13.1) |  | 80.2 | (71.8-86.5) |  | 25.1 | (19.0-32.5) |  | 55.1 | (45.7-64.0) |  |
| Far-western | 418 | 36.7 | 1.3 | 3.1 | (1.7-5.8) |  | 10.0 | (7.3-13.6) |  | 86.9 | (83.1-89.9) |  | 41.6 | (35.3-48.1) |  | 45.3 | (38.8-52.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 350 | 42.2 | 1.5 | 1.8 | (0.6-5.1) |  | 6.6 | (3.7-11.2) |  | 91.6 | (85.7-95.2) |  | 34.3 | (30.2-38.5) |  | 57.3 | (50.2-64.2) |  |
| Hill | 875 | 45.8 | 0.6 | 4.6 | (3.1-6.6) | 0.045 | 6.2 | (5.1-7.5) | 0.728 | 89.3 | (86.8-91.3) | 0.111 | 16.9 | (14.2-19.9) | <0.001 | 72.4 | (68.7-75.8) | <0.001 |
| Terai | 884 | 42.9 | 0.5 | 2.7 | (1.7-4.3) |  | 5.3 | (3.1-9.1) |  | 92.0 | (88.1-94.7) |  | 27.7 | (23.4-32.4) |  | 64.3 | (58.3-69.9) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 294 | 49.9 | 0.9 | 0.8 | (0.1-6.0) | 0.005 | 2.0 | (0.7-5.6) | 0.003 | 97.1 | (91.0-99.9) | <0,001 | 16.7 | (10.7-25.1) |  | 80.5 | (71.2-87.3) |  |
| Rural | 1,815 | 43.2 | 0.4 | 3.9 | (2.9-5.2) |  | 6.4 | (4.8-8.4) |  | 89.7 | (87.2-91.8) |  | 24.3 | (21.3-27.5) | 0.005 | 65.4 | (61.3-69.4) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 556 | 37.0 | 1.0 |  | (6.7-14.3) |  | 12.1 | (9.7-15.1) |  | 78.0 | (72.6-82.6) |  | 26.1 | (21.1-31.8) |  | 51.9 | (44.8-58.9) |  |
| Second | 429 | 42.2 | 1.0 | 1.9 | (0.8-4.0) |  | 9.7 | (6.6-14.1) |  | 88.4 | (84.2-91.7) |  | 27.3 | (23.0-31.9) |  | 61.2 | (54.8-67.2) |  |
| Middle | 402 | 44.6 | 0.8 | 3.2 | (2.0-5.3) | <0.001 | 4.4 | (2.0-9.3) | <0.001 | 92.3 | (87.0-95.6) | <0.001 | 25.3 | (21.7-29.4) | <0.001 | 67.0 | (61.3-72.2) | <0.001 |
| Fourth | 401 | 47.2 | 0.8 | 1.3 | (0.6-2.9) |  | 1.9 | (0.8-4.4) |  | 96.8 | (94.2-98.3) |  | 25.1 | (19.6-31.5) |  | 71.7 | (64.8-77.8) |  |
| Highest | 321 | 49.9 | 0.6 | 1.0 | (0.3-3.4) |  | 1.0 | (0.3-3.3) |  | 98.0 | (95.7-99.1) |  | 12.4 | (8.6-17.5) |  | 85.6 | (80.3-89.6) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 264 | 48.7 | 1.0 | 3.0 | (1.1-8.0) |  | 1.8 | (0.8-3.7) |  | 95.3 | (89.3-98.0) |  | 14.9 | (11.4-19.4) |  | 80.3 | (73.7-85.6) |  |
| Hill Chhetri | 503 | 44.4 | 0.9 | 4.5 | (3.0-6.8) |  | 4.5 | (3.0-6.7) |  | 91.0 | (87.9-93.4) |  | 22.5 | (19.2-26.1) |  | 68.6 | (64.1-72.8) |  |
| Terai Brahmin/Chhetri | 56 | 41.8 | 2.0 |  | (0.4-15.8) |  | 3.0 | (0.9-10.3) |  | 94.4 | (84.0-98.2) |  | 31.3 | (20.7-44.3) |  | 63.1 | (49.0-75.3) |  |
| Other Terai caste | 150 | 38.5 | 1.1 | 1.4 | (0.3-6.4) |  | 6.7 | (3.2-13.7) |  | 91.9 | (84.1-96.0) |  | 43.9 | (31.9-56.7) |  | 48.0 | (36.1-60.1) |  |
| Hill Dalit | 248 | 43.5 | 1.4 | 3.6 | (2.2-5.9) | <0.001 | 7.7 | (4.7-12.5) |  | 88.7 | (83.6-92.4) |  | 26.5 | (19.7-34.6) |  | 62.2 | (53.8-70.0) |  |
| Terai Dalit | 88 | 37.6 | 1.7 |  | (1.1-8.7) | <0.001 | 13.5 | (6.7-25.3) | 0.001 | 83.4 | (71.9-90.8) | <0.001 | 28.8 | (19.2-40.9) | <0.001 | 54.5 | (37.1-70.9) | <0.001 |
| Newar | 76 | 48.4 | 1.1 |  | (0.1-4.5) |  | 2.1 | (0.4-11.2) |  | 97.2 | (90.1-99.2) |  | 14.5 | (8.8-22.8) |  | 82.7 | (71.2-90.3) |  |
| Hill Janajati | 505 | 45.9 | 0.8 |  | (2.4-7.3) |  | 7.2 | (6.0-8.6) |  | 88.6 | (85.4-91.3) |  | 16.8 | (13.5-20.7) |  | 71.9 | (67.0-76.3) |  |
| Terai Janajati | 178 | 45.2 | 1.2 | 1.4 | (0.5-4.1) |  | 5.6 | (1.7-16.9) |  | 92.9 | (82.7-97.3) |  | 23.5 | (18.4-29.4) |  | 69.5 | (60.0-77.5) |  |
| Muslim | 39 | (33.4) | (3.4) | (16.6) | (4.2-47.5) |  | (6.6) | (2.9-14.2) |  | (76.8) | (45.3-93.0) |  | (29.6) | (17.5-45.5) |  | (47.2) | (27.6-67.7) |  |
| Total | 2,109 | 44.2 | 0.4 | 3.5 | (2.6-4.6) |  | 5.8 | (4.5-7.5) |  | 90.7 | (88.7-92.5) |  | 23.2 | (20.8-25.9) |  | 67.5 | (64.2-70.7) |  |

Note: N unweighted. All estimates account for weighting and complex sample design. Figures in parentheses are based on 25-49 sample size
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
P-value obtan ane titration method
a Analyzed by the
bIn previous surveys in Nepal, $>15$ p
${ }^{\text {b }}$ In previous surveys in Nepal, $\geq 15 \mathrm{ppm}$ has been used to indicate adequately iodized salt. This definition allows for comparison to other surveys in Nepal. comparisons.
Table 16.10: Level of lodization among Crystal Salt (Phoda) Samples, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Crystal salt samples |  | Crystal Salt (Phoda) samples Iodized mg/kg, ppm ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Not iodized<5 |  | 5 to <15 |  |  |  |  |  | >40 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Mean | Standard Error | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | \% (95\% CI) |  |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 55 | 20.4 | 2.4 | 23.6 | (6.7-57.0) | 20.0 | (13.9-28.0) | 56.4 | (30.4-79.3) | 40.0 | (25.0-57.1) | 16.4 | (6.9-33.9) |
| Central | 24 |  | * | * |  | * |  | * | * | * | * | * | * |
| Western | 20 | * | * | * | * | * | * | * | * | * | * | * | * |
| Mid-western | 96 | 9.7 | 1.4 | 39.6 | (30.1-49.9) | 38.5 | (28.3-50.0) | 21.9 | (15.1-30.6) | 19.8 | (13.6-27.9) | 2.1 | (0.5-8.4) |
| Far-western | 143 | 20.6 | 1.1 | 8.4 | (4.2-16.2) | 28.0 | (20.8-36.5) | 63.6 | (54.8-71.6) | 54.5 | (45.3-63.4) | 9.1 | (5.6-14.5) |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 70 | 20.5 | 1.6 | 11.4 | (4.2-27.5) | 25.7 | (17.9-35.4) | 62.9 | (49.0-74.9) | 55.7 | (45.7-65.3) | 7.1 | (3.5-14.2) |
| Hill | 194 | 17.2 | 1.1 | 20.6 | (12.8-31.5) | 30.9 | (24.5-38.2) | 62.9 | (49.0-74.9) | 38.7 | (31.0-46.9) | 9.8 | (6.0-15.6) |
| Terai | 74 | 10.0 | 1.2 | * | * | * | * | * | * | * | * | * | * |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 14 | * | * | * | * | * | * | * | * | * | * | * | * |
| Rural | 324 | 16.0 | 0.8 | 21.9 | (15.9-29.3) | 30.9 | (26.2-36.0) | 47.2 | (40.1-54.4) | 39.2 | (33.5-45.2) | 8.0 | (5.4-11.8) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 182 | 16.2 | 1.0 | 20.3 | (12.5-31.4) | 31.3 | (24.4-39.1) | 48.4 | (39.5-57.3) | 42.9 | (34.6-51.6) | 5.5 | (3.3-9.1) |
| Second | 86 | 17.3 | 1.6 | 17.4 | (10.3-28.0) | 36.0 | (28.8-44.0) | 46.5 | (34.7-58.8) | 34.9 | (25.8-45.3) | 11.6 | (6.0-21.4) |
| Middle | 47 | (15.4) | (2.2) | (29.8) | (15.2-50.2) | (27.7) | (17.7-40.5) | (42.6) | (27.7-58.9) | (34.0) | (21.7-49.0) | (8.5) | (3.2-20.6) |
| Fourth | 17 |  | * | * | * | * | * | * | * | * | * | * | * |
| Highest | 6 | * | * | * | * | * | * | * | * | * | * | * | * |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 30 | (16.2) | (2.4) | (23.3) | (10.0-45.6) | (20.0) | (12.0-31.4) | (56.7) | (33.8-77.0) | (50.0) | (30.0-70.0) | (6.7) | (1.5-25.2) |
| Hill Chhetri | 120 | 20.0 | 1.5 | 14.2 | (8.5-22.7) | 28.3 | (20.1-38.3) | 57.5 | (47.6-66.8) | 46.7 | (37.0-56.6) | 10.8 | (6.8-16.8) |
| Terai Brahmin/Chhetri | 5 |  | * | * | * | * | * | * | * | * | * | * | * |
| Other Terai caste | 12 | * | * | * | * | * | * | * | * | * | * | * | * |
| Hill Dalit | 54 | 16.1 | 1.7 | 18.5 | (9.6-32.8) | 37.0 | (24.4-51.7) | 44.4 | (31.6-58.1) | 37.0 | (24.3-51.9) | 7.4 | (3.0-17.2) |
| Terai Dalit | 9 |  | * | * | * | * | * | * | * | * | * | * | * |
| Newar | 1 | * | * | * | * | * | * | * | * | * | * | * | * |
| Hill Janajati | 81 | 16.5 | 1.7 | 24.7 | (11.7-44.7) | 30.9 | (24.9-37.5) | 44.4 | (31.6-58.1) | 35.8 | (26.5-46.4) | 8.6 | (4.0-17.6) |
| Terai Janajati | 12 |  | * | * | * | * | * | * | * | * | * | * | * |
| Muslim | 13 | * | * | * | * | * | * | * | * | * | * | * | * |
| Total | 338 | 16.3 | 0.8 | 22.5 | (16.6-29.7) | 31.1 | (26.5-36.0) | 46.4 | (39.5-53.6) | 38.8 | (33.1-44.7) | 7.7 | (5.2-11.3) |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of $25-49$ and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
a Analyzed by the titration method
${ }^{\text {b }}$ In previous surveys in Nepal, $\geq 15 \mathrm{ppm}$ has been used to indicate adequately iodized salt. This definition allows for comparison to other surveys in Nepal.
${ }^{\text {ch }}$ Whor
${ }^{\text {' WHO. Assessment of iodine deficiency disorders and monitoring their elimination considers salt iodized with 15-40 ppm (section 6.1, page 52) at the household level to be adequately iodized. This definition allows for global }}$
Table 16.11: Level of lodization among Refined Salt Samples, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Refined salt samples |  | Refined Salt samples Iodized mg/kg, ppma ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Not iodized<5 |  |  | Iodized, ppm |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5 to <15 | $\geq 15^{\text {b }}$ |  |  | $\geq 15$ to 40 ${ }^{\text {c }}$ |  |  | >40 |  |  |
|  |  | Mean | Standard Error |  |  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 321 | 49.4 | 0.9 | 0.9 | (0.3-2.9) |  | 2.8 | (0.7-10.5) |  | 96.3 | (89.3-98.8) |  |  | (14.9-23.2) |  | 77.6 | (70.7-83.2) |  |
| Central | 395 | 47.0 | 0.7 | 0.5 | (0.1-2.0) |  | 2.3 | (1.0-5.1) |  | 97.2 | (94.4-98.6) |  |  | (16.0-25.9) |  | 76.7 | (71.2-81.4) |  |
| Western | 355 | 50.0 | 0.8 | - |  | 0.082 | 2.3 | (0.5-9.5) | 0.103 | 97.7 | (90.5-99.5) | 0.549 | 20.8 | (15.0-28.2) | 0.110 | 76.9 | (67.9-84.0) | 0.346 |
| Mid-western | 270 | 47.2 | 0.9 | 1.9 | (0.7-4.9) |  |  |  |  | 98.1 | (95.1-99.3) |  |  | (20.0-32.0) |  | 72.6 | (65.7-78.6) |  |
| Far-western | 222 | 46.9 | 0.9 | 0.5 | (0.1-3.1) |  | 1.4 | (0.4-4.1) |  | 98.2 | (95.4-99.3) |  | 26.6 | (17.6-38.0) |  | 71.6 | (60.6-80.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 132 | 48.3 | 1.2 | - | - |  | - | - |  | 100.0 | (100.0-100.0) |  |  | (20.8-36.6) |  | 72.0 | (63.4-79.2) |  |
| Hill | 626 | 52.1 | 0.5 | 0.8 | (0.3-1.9) | 0.596 | 0.5 | (0.2-1.2) | <0.001 | 98.7 | (97.4-99.4) | 0.001 | 13.9 | (10.7-17.9) | <0.001 | 84.8 | (80.9-88.1) | <0.001 |
| Terai | 805 | 45.2 | 0.5 | 0.7 | (0.3-1.8) |  | 3.2 | (1.6-6.5) |  | 96.0 | (92.8-97.8) |  | 27.2 | (23.0-31.9) |  | 68.8 | (63.2-73.9) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 280 | 51.5 | 0.8 | 0.0 |  | 0.120 | 0.7 | (0.2-2.7) |  | 99.3 | (97.3-99.8) | 0.031 |  | (11.3-23.2) | 0.014 | 82.9 | (76.1-88.0) | 0.002 |
| Rural | 1,283 | 47.5 | 0.4 | 0.9 | (0.5-1.6) |  | 2.1 | (1.1-4.2) |  | 97.0 | (95.0-98.3) |  |  | (20.0-26.7) |  | 73.9 | (69.9-77.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 165 | 48.3 | 1.0 | 0.6 | (0.1-4.0) |  | 0.6 | (0.5-0.8) |  | 98.8 | (96.9-99.5) |  |  | (16.3-34.4) |  | 74.5 | (64.3-82.6) |  |
| Second | 256 | 48.2 | 0.9 |  |  |  | 2.0 | (0.5-6.8) |  | 98.0 | (93.2-99.5) |  | 21.9 | (17.9-26.5) |  | 76.2 | (69.8-81.5) |  |
| Middle | 340 | 48.1 | 0.9 | 1.2 | (0.4-3.1) | 0.424 | 2.4 | (0.9-5.8) | 0.393 | 96.5 | (93.0-98.2) | 0.197 | 22.6 | (19.0-26.8) | 0.015 | 73.8 | (69.0-78.2) | 0.003 |
| Fourth | 383 | 46.3 | 0.8 | 1.0 | (0.3-3.5) |  | 2.6 | (1.3-5.2) |  | 96.3 | (93.1-98.1) |  |  | (21.0-32.5) |  | 70.0 | (63.7-75.6) |  |
| Highest | 419 | 50.0 | 0.6 | 0.5 | (0.1-1.9) |  | 1.2 | (0.5-2.8) |  | 98.3 | (96.6-99.2) |  | 16.5 | (12.7-21.0) |  | 81.9 | (77.1-85.8) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 216 | 51.8 | 0.9 | 0.5 | (0.1-3.3) |  | - | - |  | 99.5 | (96.7-99.9) |  | 14.4 | (10.6-19.1) |  | 85.2 | (80.4-89.0) |  |
| Hill Chhetri | 316 | 49.8 | 0.7 | 1.3 | (0.5-3.3) |  | - |  |  | 98.7 | (96.7-99.5) |  |  | (14.0-23.0) |  | 80.7 | (75.8-84.8) |  |
| Terai Brahmin/ Chhetri | 49 | (45.6) | (2.2) | - | - |  | (2.0) | (0.3-13.1) |  | (98.0) | (86.9-99.7) |  | (28.6) | (16.6-44.6) |  | (69.4) | (52.6-82.3) |  |
| Other Terai caste | 138 | 38.6 | 1.4 | - | - |  | 6.5 | (2.7-15.0) |  | 93.5 | (85.0-97.3) |  |  | (35.6-58.9) |  | 46.4 | (35.3-57.8) |  |
| Hill Dalit | 151 | 48.4 | 1.1 | - | - |  | 0.7 | (0.1-4.5) |  | 99.3 | (95.5-99.9) |  | 29.8 | (22.2-38.6) |  | 69.5 | (60.8-77.1) |  |
| Terai Dalit | 79 | 38.5 | 2.1 | 2.5 | (0.7-8.9) |  | 11.4 | (4.9-24.2 |  | 86.1 | (74.5-92.9) |  | 30.4 | (20.5-42.4) |  | 55.7 | (38.0-72.0) |  |
| Newar | 75 | 49.6 | 1.3 | - | - |  | 1.3 | (0.2-8.3) |  | 98.7 | (91.7-99.8) |  | 14.7 | (8.5-24.1) |  | 84.0 | (73.2-91.0) |  |
| Hill Janajati | 347 | 51.9 | 0.7 | 0.6 | (0.1-2.3) |  | 0.6 | (0.2-1.6) |  | 98.8 | (97.3-99.5) |  | 14.1 | (10.7-18.4) |  | 84.7 | (80.4-88.2) |  |
| Terai Janajati | 165 | 46.8 | 1.1 | - |  |  | 3.6 | (1.2-10.3) |  | 96.4 | (89.7-98.8) |  |  | (17.1-28.8) |  | 73.9 | (66.8-80.0) |  |
| Muslim | 26 | (37.9) | (3.7) | (7.7) | (1.1-38.1) |  | - |  |  | (92.3) | (61.9-98.9) |  | (38.5) | (23.9-55.4) |  | (53.8) | (35.5-71.2) |  |
| Total | 1,563 | 48.2 | 0.4 | 0.7 | (0.4-1.3) |  | 1.9 | (1.0-3.5) |  | 97.4 | (95.8-98.5) |  | 21.9 | (19.3-24.9) |  | 75.5 | (72.2-78.5) |  |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of $25-49$ and should be interpreted with caution. Sample size might vary slightly due to missing data.
Prevalence estimates in parentheses based on a s
P-value obtained from Pearson's chi-square test.
P-value ob by the titration method
a
${ }^{\text {b }}$ In previous surveys in Nepal, $\geq 15 \mathrm{ppm}$ has been used to indicate adequately iodized salt. This definition allows for comparison to other surveys in Nepal.
'WHO. Assessment of iodine deficiency disorders and monitoring their elimination considers salt iodized with $15-40 \mathrm{ppm}$ (section 6.1, page 52) at the household level to be adequately iodized. This definition allows for global
comparisons.
Table 16.12: Level of lodization among Crushed Salt Samples, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Crushed salt samples |  | Crushed salt samples Iodized mg/kg, ppm ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Iodized, ppm |  |  |  |  |  |
|  |  |  |  | $\geq 15^{\text {b }}$ |  | $\geq 15$ to $40^{\text {c }}$ |  | >40 |  |
|  |  | Mean | Standard Error | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |
| Eastern | 50 | 44.3 | 2.8 | 90.0 | (79.1-95.5) | 32.0 | (19.9-47.1) | 58.0 | (39.5-74.5) |
| Central | 0 | * | * | * |  | * | * | * | * |
| Western | 50 | 57.1 | 3.8 | 100.0 |  | 32.0 | (13.2-59.2) | 68.0 | (40.8-86.8) |
| Mid-western | 55 | 43.7 | 2.0 | 100.0 |  | 47.3 | (32.4-62.6) | 52.7 | (37.4-67.6) |
| Far-western | 53 | 36.9 | 1.2 | 100.0 |  | 69.8 | (62.1-76.6) | 30.2 | (23.4-37.9) |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 148 | 49.8 | 1.7 | 99.3 | (95.2-99.9) | 35.1 | (26.6-44.8) | 64.2 | (54.2-73.0) |
| Hill | 55 | 35.7 | 1.7 | 96.4 | (94.3-97.7) | 72.7 | (61.0-82.0) | 23.6 | (14.8-35.6) |
| Terai | 5 | * | * | . | * | . | (61.0-82.0) | * | * |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 0 | * | * | * | * | * | * | * | * |
| Rural | 208 | 45.3 | 1.4 | 97.6 | (94.3-99.0) | 45.7 | (37.4-54.2) | 51.9 | (43.1-60.6) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 76 | 43.0 | 2.0 | 98.7 | (97.9-99.2) | 53.9 | (41.6-65.8) | 44.7 | (33.0-57.1 |
| Second | 50 | 45.7 | 2.4 | 96.0 | (90.8-98.3) | 32.0 | (24.7-40.3) | 64.0 | (55.5-71.7) |
| Middle | 43 | (47.0) | (3.0) | (97.7) | (85.6-99.7) | (39.5) | (27.7-52.8) | (58.1) | (43.8-71.2) |
| Fourth | 34 | (44.8) | (4.0) | (97.1) | (81.1-99.6) | (52.9) | (31.2-73.6) | (44.1) | (24.4-65.8) |
| Highest | 5 | * | * | * | * | , | * | * | * |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 18 | * | * | * | * | * | * | * | * |
| Hill Chhetri | 67 | 41.0 | 1.9 | 98.5 | (89.6-99.8) | 0.0 | - | 41.8 | (28.1-56.9) |
| Terai Brahmin/Chhetri |  | * | * | * | - | * | * | , | * |
| Other Terai caste | 0 | * | * | * | * | * | * | * | * |
| Hill Dalit | 43 | (46.0) | (2.2) | (100.0) | - | (44.2) | (25.6-64.5) | (55.8) | (35.5-74.4) |
| Terai Dalit | 0 | * | * | * | * | * | * | * | * |
| Newar | 0 | * | * | * | * | * | * | * | * |
| Hill Janajati | 77 | 50.8 | 2.9 | 96.1 | (91.6-98.2) | 35.1 | (20.3-53.3) | 61.0 | (42.3-77.0) |
| Terai Janajati | , |  | * | , | , | * | , | , | * |
| Muslim | 0 | * | * | * | * | * | * | * | * |
|  | 208 | 45.3 | 1.4 | 97.6 | (94.3-99.0) | 45.7 | (37.4-54.2) | 51.9 | (43.1-60.6) |

a Analyzed by the titration method
bIn previous surveys in Nepal, $\geq 15 \mathrm{ppm}$ has been used to indicate adequately iodized salt. This definition allows for comparison to other surveys in Nepal.
${ }^{\text {}}$ WHO. Assessment of iodine deficiency disorders and monitoring their elimination considers salt iodized with 15-40 ppm (section 6.1, page 52) at the household level to be adequately iodized. This definition allows for global comparisons.

## Household Purchase of

 Wheat Flour and Availability on the Day of the Survey, and Iron Content of Fortifiable
## Household Wheat Flour

## Samples

This chapter describes the consumption pattern of purchased wheat flour in the households, as well as availability of purchased flour the day of the survey and iron content of fortifiable wheat flour samples (purchased, not home grown or purchased from small Chakki mills) collected from households. In Nepal, mainly two types of purchased wheat flour consumed: 1. Roller milled refined wheat flour that is high extraction and with all bran removed called Maida; 2. roller milled or large commercial Chakki milled wheat flour that is low extraction with varying levels of bran called Atta. In Nepal, only Maida and Atta flours produced in roller mills are required to be fortified under the mandatory regulation; atta milled from local small mills or at the home is referred to as Pitho Atta. In Nepal, there are 20 large roller mills, approximately 25,000 small "Chakki" mills and water powered mills, which are specially used in the rural areas for grinding wheat.

### 17.1 Household Purchasing Patterns of Wheat Flour

In Nepal, purchasing grain and taking them it to mill at local Chakki mills is not a common practice as three-fourths ( 76 percent) of the households reported never purchasing grains and milling them at local Chakki mills (Table 17.1). Eight percent reported they often purchase the grains and mill them at local Chakki mills ranging from 17 percent reporting this in the Farwestern region to five percent in the Western region and from 14 percent in the Terai to three percent in the Hill.

More common is the practice of self-milling locally grown wheat - almost six in ten households (59 percent) locally grow wheat (Pitho/Atta) and mill it. Forty-five percent had ever purchased roller milled refined Maida wheat flour and 43 percent had ever purchased roller milled/large commercial Chakki milled Atta flour. The proportion of households purchasing Maida ranged from 18 percent in Far-western region to 54 percent in the Central region. Fifty percent of the households in the Mountain, 42 percent in Hill and 48 percent in the Terai purchased Maida. In urban areas, around half ( 51 percent) purchased and in rural areas 45 percent purchased Maida. The proportion of households purchasing Maida significantly increased with increasing wealth quintile ( 30 percent among the lowest quintile to 54 percent among the highest quintile). Atta was more commonly purchased in the Western region (53 percent) and least commonly in the Far-western ( 13 percent). Atta, was purchased by 23 percent, 43 percent and 46 percent, respectively, in the Mountain, Hill and Terai. Atta was more commonly purchased in urban areas than rural areas ( 64 percent versus 40 percent). By wealth quintile, purchasing of Atta varied from 23 percent in the lowest quintile to 72 percent in the highest quintile (Table 17.2).

Among the households who purchased Maida, only two percent purchased this flour year round while the majority ( 98 percent) purchased it only seasonally. Among the households that purchased roller milled/large commercial Chakki milled Atta flour, 27 percent reported purchasing it year round. Among the households that grow wheat or purchase from local Chakki mills, 60 percent do so year round (Table 17.3).

The survey captured home-use of Maida and Atta flours, not consumption of Maida and Atta flours outside of the home, or in purchased or pre-prepared snack foods and convenience foods commonly prepared from Maida. However, Chapter 18 describes purchase of noodles and biscuits that are often prepared with industrially produced wheat flour

### 17.2 Estimated Per-capita Daily Availability of Purchased Wheat Flour

Table 17.4 shows the per-capita availability of purchased Maida and purchased Atta. Among the households who purchased Maida, the per-capita availability was 3.6 gram per day and among the households who purchased Atta, the per-capita availability was 20.8 gram per day. The per-capita availability of any type of purchased flour was 5.7 gram per day. This does not include indirect flour availability in the form of other food made from wheat flour in the households.

### 17.3 Availability of Purchased Wheat Flour the Day of the Survey, Packaging and Labeling

Tables 17.5 and 17.6 present information on the availability of purchased wheat flour on the day of survey, observation of flour used in the home, observation of whether advertising claims (i.e. not nutritional or ingredient panel) of fortification (iron, folic acid, or vitamin A) were present on the packaging. Among the households that reported consumption of purchased Maida wheat flour to prepare foods at home, nine percent reported any available on the day of survey. Among them, 86 percent showed the enumerator the Maida flour, and among them, 14 percent of the Maida wheat flour shown was in the original packaging (Table 17.5). Most of the observed Maida wheat flour (87 percent) in the original packaging were Nepali brands (data not shown). Among the households reported they consumed roller milled/large commercial Chakki milled Atta wheat flour to prepare foods at home, 43 percent reported having some Atta flour on the day of survey. Among them, 96 percent showed the enumerator the Atta flour, and among them, six in ten of the wheat flour shown was in the original packaging (Table 17.6). Most of the observed Atta (96 percent) were Nepali brands (data not shown).

As many households did not have flour observable in the original packaging, it is not possible to make conclusions with certainty regarding the origin sources for Maida and Atta. Purchased wheat flour from large roller mills that was not from local small mills or produced at the home was considered "fortifiable" for this survey. In the past, large roller mill flour had been fortified on a voluntary basis with iron ( 60 mg of elemental iron powders $/ \mathrm{kg}$ ), folic acid ( $1.5 \mathrm{mg} / \mathrm{kg}$ ) and vitamin A (1 mg of vitamin A1/kg) and in 2011 wheat flour fortification for roller mills was made mandatory. Table 17.7 shows that among the observed Maida wheat flour in the original packaging, nine percent had a label saying fortified with "iron", while eight percent stated it was fortified with "folic acid" and another nine percent had labeling indicating it was fortified with "vitamin A". Similarly, Table 17.8 shows that among the observed roller milled/large commercial Chakki milled Atta wheat flour in the original packaging, 44 percent had a label saying it was fortified with "iron", while 39 percent stated it was fortified with "folic acid" and another 40 percent stated it was fortified with "vitamin A".

### 17.4 Presence of Iron Fortificant and Iron Content in Household Food Samples of Purchased Wheat Flour

Table 17.9 shows the result of the qualitative iron spot test to determine the presence of an iron fortificant. In flour that is fortified, red or pink spots will appear confirming fortification. There may be intrinsic iron in the flour, but if it is not fortified, then there will be no spots and all of the flour may have a pink color. Among the households with purchased wheat flour samples, two in ten ( 20 percent) Maida samples tested positive for iron using the iron spot test, and almost four in ten (36 percent) Atta samples tested positive. The qualitative iron spot test identifies added iron (extrinsic), as the reagents interact with ferrous or ferric forms of iron (the most commonly added iron compounds). On the other hand, quantitative iron analyses use methods that are unable to differentiate between extrinsic or intrinsic (naturally occurring) iron.

Table 17.10 shows the results for mean iron levels in all tested samples: overall, the mean iron level in the tested wheat flour samples was $55.1 \mathrm{mg} / \mathrm{kg}$ ranging from $2 \mathrm{mg} / \mathrm{kg}$ to $242.3 \mathrm{mg} / \mathrm{kg}$ (Data not shown). Among the samples testing positive for iron using the iron spot test ( $\mathrm{N}=226$ ), the mean iron content was $76.4 \mathrm{mg} / \mathrm{kg}$.

Among all of the wheat flour samples, four in ten wheat flour samples had an iron level $>60$ $\mathrm{mg} / \mathrm{kg}$. Among those testing positive with the qualitative spot test, 70 percent wheat flour samples had an iron level meeting Nepal's standard for iron in wheat flour i.e. $>60 \mathrm{mg} / \mathrm{kg}$ (Table 17.11).

Among the different types of wheat flour tested, the mean iron level in Maida was $32.2 \mathrm{mg} / \mathrm{kg}$ (Table 17.12) with 13 percent of the sample meeting Nepal's standard for iron in wheat flour (Table 17.13). The mean iron level in Atta was $54.1 \mathrm{mg} / \mathrm{kg}$ (Table 17.14) and 36 percent purchased wheat flour samples had an iron content $\geq 60 \mathrm{mg} / \mathrm{kg}$ (Table 17.15).

As a minority of households had observable flour available for sample collection, these results can only be extrapolated to households that had flour available for analysis.

## List of Tables

For more information on the household purchase of wheat flour and consumption of iron fortified wheat flour, see the following tables:

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Table 17.15: Iron Content in All Purchased Atta Flour, Assessed by AOAC International Official Method

Table 17.1: Purchase of Grain and Milling at Local Chakki Mills, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Frequency of purchase grain and take to mill at local chakki mills |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | N | Never |  |  | Rarely |  |  | Sometimes |  |  | Often |  |  |
|  |  | \% | (95\% CI) | pvalue | \% | (95\% CI) | pvalue | \% | (95\% CI) | pvalue | \% | (95\% CI) | pvalue |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 71.9 | (62.5-79.7) |  | 12.3 | (9.7-15.5) |  | 12.3 | (9.7-15.5) |  | 9.0 | (4.9-16.0) |  |
| Central | 862 | 76.9 | (73.0-80.4) |  | 3.8 | (2.7-5.2) |  | 11.1 | (9.5-12.9) |  | 8.2 | (6.5-10.3) |  |
| Western | 859 | 81.7 | (77.3-85.5) | $<0.00$ | 4.9 | (3.9-6.2) | 0.014 | 8.2 | (5.8-11.5) | 0.011 | 5.1 | (3.7-7.1) | <0.001 |
| Mid-western | 862 | 75.3 | (70.3-79.6) |  | 5.5 | (3.9-7.8) |  | 13.3 | (11.0-16.1) |  | 5.9 | (3.4-10.0) |  |
| Far-western | 862 | 65.1 | (58.5-71.2) |  | 4.2 | (2.9-6.2) |  | 13.3 | (10.2-17.3) |  | 17.4 | (13.6-21.8) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 78.2 | (73.8-82.0) |  | 4.0 | (2.2-7.2) |  | 13.6 | (11.0-16.8) |  | 4.2 | (2.9-6.0) |  |
| Hill | 1,794 | 85.3 | (82.8-87.4) | <0.001 | 4.7 | (3.9-5.6) | 0.413 | 6.8 | (5.5-8.3) | <0.001 | 3.3 | (2.6-4.2) | <0.001 |
| Terai | 1,796 | 65.7 | (60.5-70.5) |  | 5.4 | (4.1-7.2) |  | 15.3 | (13.5-17.3) |  | 13.6 | (10.8-17.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 77.0 | (63.5-86.5) |  | 3.6 | (2.1-6.2) |  | 10.5 | (6.6-16.4) |  | 8.9 | (4.0-18.8) | 6 |
| Rural | 3,711 | 75.2 | (71.7-78.4) | 0.353 | 5.2 | (4.3-6.3) | 0.106 | 11.4 | (9.9-13.1) | 0.526 | 8.2 | (6.6-10.0) | . 566 |
| Sex of Household Head |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 1,369 | 74.1 | (69.1-78.5) |  | 4.9 | (3.8-6.4) |  | 11.5 | (9.8-13.5) |  | 9.5 | (6.7-13.2) |  |
| Female | 2,940 | 76.1 | (73.5-78.5) | 0.146 | $5.0$ | $(4.1-6.1)$ | 0.874 | $11.2$ | (9.9-12.6) | 0.744 | $7.7$ | (6.4-9.3) | 0.052 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 74.6 | (71.0-77.9) |  | 5.7 | (4.3-7.6) |  | 12.3 | (10.2-14.7) |  | 7.4 | (5.5-9.8) |  |
| Second | 902 | 73.0 | (67.9-77.6) |  | 5.5 | (4.2-7.2) |  | 12.7 | (10.1-15.8) |  | 8.8 | (6.2-12.3) |  |
| Middle | 813 | 69.8 | (65.1-74.1) | <0.001 | 7.2 | (5.4-9.6) | $<0.001$ | 14.0 | (11.1-17.6) | $<0.001$ | 9.0 | (7.0-11.4) | 0.049 |
| Fourth | 789 | 75.1 | (69.8-79.8) |  | 4.0 | (2.9-5.7) |  | 10.8 | (8.8-13.3) |  | 10.0 | (7.0-14.1) |  |
| Highest | 650 | 84.7 | (80.5-88.1) |  | 2.5 | (1.6-4.0) |  | 6.6 | (4.6-9.4) |  | 6.2 | (4.2-9.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 77.0 | (70.4-82.5) |  | 5.2 | (3.5-7.6) |  | 11.0 | (7.9-15.2) |  | 6.8 | (4.7-9.9) |  |
| Hill Chhetri | 1,045 | 79.6 | (75.5-83.2) |  | 4.2 | (3.4-5.3) |  | 10.7 | (8.4-13.4) |  | 5.4 | (3.9-7.6) |  |
| Terai |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 111 | 59.2 | (49.3-68.4) |  | 3.0 | (1.0-9.1) |  | 17.4 | (11.2-26.0) |  | 20.4 | (12.9-30.7) |  |
| Other Terai caste | 291 | 55.1 | (46.5-63.5) |  | 6.1 | (3.9-9.4) |  | 17.8 | (13.8-22.5) |  | 21.0 | (14.8-29.0) |  |
| Hill Dalit | 510 | 76.8 | (71.4-81.5) | <0.001 | 5.0 | (2.8-8.6) | 0.001 | 9.8 | (7.5-12.8) | $<0.001$ | 8.4 | (5.9-11.9) | <0.001 |
| Terai Dalit | 183 | 57.8 | (37.7-75.6) |  | 10.2 | (5.5-18.1) |  | 16.3 | (8.5-28.8) |  | 15.7 | (7.1-31.1) |  |
| Newar | 152 | 97.0 | (93.9-98.5) |  | 0.0 | - |  | 1.7 | (0.6-5.3) |  | 1.3 | (0.8-2.1) |  |
| Hill Janajati | 1,027 | 84.6 | (81.0-87.7) |  | 4.9 | (3.9-6.2) |  | 8.3 | (6.2-11.0) |  | 2.1 | (1.4-3.3) |  |
| Terai Janajati | 354 | 68.8 | (55.0-79.8) |  | 5.0 | (3.1-8.0) |  | 13.1 | (7.7-21.4) |  | 13.1 | (7.5-21.7) |  |
| Muslim | 80 | 64.3 | (51.7-75.1) |  | 7.5 | (2.6-20.0) |  | 19.2 | (10.4-32.8) |  | 9.0 | (3.5-21.0) |  |
| Total | 4,309 | 75.5 | (72.6-78.1) |  | 5.0 | (4.2-5.9) |  | 11.3 | (10.2-12.5) |  | 8.3 | (6.8-10.0) |  |

[^50]Table 17.2: Wheat Flour Used by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Wheat Flour Used for Household ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Maida Purchased ${ }^{\text {b }}$ |  |  | Atta Purchased ${ }^{\text {c }}$ |  |  | Pitho/Atta Locally Grown ${ }^{\text {d }}$ |  |  |
|  |  |  | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 48.1 | (44.2-52.0) |  | 50.9 | (41.6-60.1) |  | 43.0 | (34.0-52.5) |  |
| Central | 862 | 53.9 | (49.5-58.3) |  | 42.3 | (36.7-48.2) |  | 55.7 | (49.3-61.9) |  |
| Western | 859 | 43.1 | (38.6-47.8) | $<0.001$ | 53.0 | (45.7-60.1) | $<0.001$ | 51.6 | (41.3-61.7) | <0.001 |
| Mid-western | 862 | 38.9 | (35.5-42.5) |  | 34.8 | (28.3-42.0) |  | 83.5 | (76.4-88.8) |  |
| Far-western | 862 | 17.7 | (14.9-21.0) |  | 12.6 | (8.4-18.5) |  | 93.5 | (88.6-96.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 50.4 | (47.1-53.8) |  | 22.9 | (17.4-29.4) |  | 72.8 | (65.2-79.2) |  |
| Hill | 1,794 | 41.7 | (38.9-44.6) | <0.001 | 43.0 | (38.5-47.7) | <0.001 | 50.7 | (46.0-55.5) | <0.001 |
| Terai | 1,796 | 48.1 | (44.9-51.3) |  | 45.9 | (40.3-51.7) |  | 64.2 | (57.4-70.4) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 50.6 | (37.5-63.6) | 0.006 | 63.6 | (54.3-72.0) | <0.001 | 40.0 | (26.5-55.1) | <0.001 |
| Rural | 3,711 | 44.5 | (42.1-47.0) | 0.006 | 39.7 | (35.0-44.5) | <0.001 | 61.7 | (56.7-66.4) | 0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 29.8 | (26.8-33.1) |  | 22.6 | (17.9-28.1) |  | 71.4 | (65.8-76.4) |  |
| Second | 902 | 42.4 | (38.9-45.9) |  | 31.1 | (27.7-34.7) |  | 67.3 | (61.9-72.3) |  |
| Middle | 813 | 50.4 | (46.6-54.2) | <0.001 | 38.5 | (33.3-44.0) | <0.001 | 67.7 | (62.0-72.9) | <0.001 |
| Fourth | 789 | 50.6 | (46.2-55.0) |  | 50.4 | (44.3-56.4) |  | 53.2 | (46.6-59.7) |  |
| Highest | 650 | 53.5 | (47.4-59.5) |  | 72.4 | (67.9-76.5) |  | 33.7 | (27.9-40.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 45.1 | (40.1-50.1) |  | 57.0 | (49.8-63.9) |  | 51.6 | (44.2-59.0) |  |
| Hill Chhetri | 1,045 | 43.1 | (38.6-47.7) |  | 42.9 | (36.0-50.2) |  | 64.8 | (59.2-70.0) |  |
| Terai Brahmin/ Chhetri | 111 | 48.7 | (35.7-62.0) |  | 33.2 | (19.0-51.3) |  | 78.1 | (60.7-89.2) |  |
| Other Terai caste | 291 | 54.4 | (47.6-61.1) |  | 31.4 | (25.4-38.0) |  | 84.9 | (78.6-89.6) |  |
| Hill Dalit | 510 | 37.4 | (31.6-43.7) | <0.001 | 42.8 | (35.4-50.4) | $<0.001$ | 52.6 | (43.6-61.4) | <0001 |
| Terai Dalit | 183 | 28.8 | (22.4-36.2) | <0.001 | 37.0 | (25.9-49.7) | 0.001 | 79.4 | (67.2-87.8) | 0.001 |
| Newar | 152 | 48.0 | (35.3-61.0) |  | 72.4 | (62.4-80.5) |  | 17.0 | (7.5-34.1) |  |
| Hill Janajati | 1,027 | 50.2 | (46.5-54.0) |  | 39.3 | (33.9-45.0) |  | 45.4 | (39.9-51.0) |  |
| Terai Janajati | 354 | 45.1 | (37.4-53.0) |  | 35.9 | (28.8-43.6) |  | 71.0 | (61.3-79.0) |  |
| Muslim | 80 | 32.7 | (20.1-48.5) |  | 40.8 | (23.8-60.2) |  | 64.4 | (44.5-80.3) |  |
| Total | 4,309 | 45.4 | (43.3-47.4) |  | 43.0 | (39.6-46.5) |  | 58.7 | (54.7-62.5) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Asked for each type of wheat flour, excludes those reporting only ceremonial use; year round and seasonal intake asked among those who reported they consume each type |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Maida purchased: Roller mill refined wheat flour |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {c Atta purchased: Roller mill or large commercial chakki milled wheat flour }}$ |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d Pitho/atta locally grown: Household grown or purchased from small chakki Mill }}$ |  |  |  |  |  |  |  |  |  |  |

Table 17.3: Frequency of Wheat Flour Used by Households, Nepal National Micronutrient Status Survey, 2016


Table 17.4: Estimated Per Capita Daily Availability of Wheat Flour in the Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Per day capita availability of wheat flour in the household ${ }^{\text {a, b }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Maida purchased |  | Atta purchased |  | Any type of wheat flour purchased |  |
|  | N | Median g/day | N | Median g/day | N | Median g/day |
| Development Region |  |  |  |  |  |  |
| Eastern | 404 | 4.2 | 347 | 16.7 | 486 | 5.6 |
| Central | 495 | 3.3 | 349 | 22.2 | 552 | 5.6 |
| Western | 419 | 3.0 | 448 | 22.2 | 451 | 4.2 |
| Mid-western | 335 | 3.7 | 324 | 27.8 | 412 | 8.3 |
| Far-western | 150 | 5.0 | 112 | 27.8 | 361 | 95.2 |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 389 | 3.7 | 210 | 13.3 | 445 | 5.6 |
| Hill | 626 | 3.5 | 647 | 20.8 | 819 | 5.6 |
| Terai | 788 | 3.7 | 750 | 22.2 | 998 | 6.7 |
| Location |  |  |  |  |  |  |
| Urban | 291 | 4.2 | 365 | 23.8 | 333 | 6.1 |
| Rural | 1512 | 3.5 | 1242 | 20.8 | 1,929 | 5.6 |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 304 | 2.8 | 224 | 20.8 | 499 | 11.9 |
| Second | 372 | 3.3 | 273 | 20.8 | 471 | 6.7 |
| Middle | 398 | 4.2 | 304 | 18.5 | 476 | 5.6 |
| Fourth | 390 | 3.7 | 374 | 22.2 | 450 | 5.6 |
| Highest | 339 | 3.7 | 432 | 22.2 | 366 | 4.9 |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 237 | 3.7 | 261 | 27.8 | 287 | 5.6 |
| Hill Chhetri | 366 | 3.7 | 352 | 22.2 | 509 | 5.7 |
| Terai Brahmin/ Chhetri | 49 | (4.6) | 30 | (20.8) | 61 | 11.1 |
| Other Terai caste | 139 | 3.2 | 82 | 44.4 | 167 | 7.9 |
| Hill Dalit | 171 | 3.5 | 193 | 20.0 | 242 | 8.3 |
| Terai Dalit | 49 | (4.2) | 64 | 27.8 | 100 | 33.3 |
| Newar | 79 | 4.2 | 105 | 18.5 | 81 | 4.2 |
| Hill Janajati | 549 | 3.3 | 385 | 16.7 | 591 | 4.8 |
| Terai Janajati | 140 | 2.8 | 108 | 13.9 | 181 | 5.6 |
| Muslim | 22 | * | 25 | (95.2) | 39 | (13.3) |
|  | 1,803 | 3.6 | 1607 | 20.8 | 2,262 | 5.7 |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> Sample size might vary slightly due to missing data. <br> ${ }^{\text {a }}$ Asked for wheat flour used in households. <br> ${ }^{\text {b Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household }}$ members. |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Table 17.5: Maida Wheat Flour Purchased and Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Maida purchased ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have wheat flour the day of the survey |  |  |  | Observed ${ }^{\text {b }}$ |  |  |  | In original packaging, ${ }^{\text {b }}$, |  |  |  |
|  | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 404 | 7.3 | (4.7-11.3) |  | 37 | (96.5) | (86.6-99.1) |  | 35 | (6.8) | (2.6-17.0) |  |
| Central | 495 | 10.4 | (7.5-14.2) |  | 53 | 83.8 | (67.4-92.9) |  | 44 | (6.8) | (1.3-28.3) |  |
| Western | 419 | 10.8 | (6.6-17.2) | 0.019 | 105 | 89.7 | (81.4-94.5) | 0.123 | 97 | 29.7 | (9.7-62.4) | 0.001 |
| Mid-western | 335 | 4.4 | (2.5-7.5) |  | 16 | * | * |  | 9 | * | * |  |
| Far-western | 150 | 5.1 | (2.4-10.8) |  | 7 | * | * |  | 5 | * | * |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 389 | 8.4 | (4.6-14.6) |  | 99 | 69.0 | (47.3-84.7) |  | 87 | 16.8 | (8.6-30.3) |  |
| Hill | 626 | 11.8 | (8.7-15.7) | $<0.001$ | 73 | 90.0 | (78.8-95.6) | 0.108 | 67 | 16.1 | (6.7-33.9) | 0.518 |
| Terai | 788 | 6.5 | (4.5-9.3) |  | 46 | (83.1) | (62.8-93.5) |  | 36 | (9.9) | (2.3-34.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 291 | 16.5 | (12.4-21.6) | 001 | 47 | (87.6) | (68.7-95.8) | 636 | 40 | (3.8) | (1.0-13.2) | 0.029 |
| Rural | 1,512 | 7.4 | (5.6-9.8) |  | 171 | 85.2 | (74.0-92.1) |  | 150 | 18.2 | (8.5-34.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 304 | 2.6 | (1.6-4.1) |  | 16 | * | * |  | 11 | * | * |  |
| Second | 372 | 8.5 | (4.6-15.2) |  | 40 | (95.2) | (80.8-98.9) |  | 37 | (16.7) | (5.1-42.9) |  |
| Middle | 398 | 7.0 | (3.9-12.0) | <0.001 | 51 | 63.9 | (45.5-79.0) | <0.001 | 39 | (22.0) | (7.7-48.8) | 0.581 |
| Fourth | 390 | 8.1 | (5.1-12.5) |  | 54 | 97.8 | (85.8-99.7) |  | 52 | 14.5 | (3.2-46.9) |  |
| Highest | 339 | 15.0 | (11.5-19.4) |  | 57 | 88.6 | (72.9-95.7) |  | 51 | 9.1 | (2.3-30.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 237 | 8.9 | (4.9-15.7) |  | 22 | * | * |  | 18 | * | * |  |
| Hill Chhetri | 366 | 8.6 | (5.6-12.9) |  | 32 | (87.9) | (64.9-96.6) |  | 26 | (11.6) | (3.0-35.9) |  |
| Terai ${ }^{\text {Brahmin/Chhetri }}$ | 49 | (3.5) | (0.7-16.1) |  | 1 | * | * |  | 1 | * | * |  |
| Brahmin/Chhetri |  |  |  |  |  |  |  |  |  |  |  |  |
| Other Terai caste | 139 | 8.7 | (3.8-18.6) |  | 11 | * | * |  | 10 | * | * |  |
| Hill Dalit | 171 | 6.2 | (3.5-11.0) | $<0.001$ | 14 | * | * | 0.986 | 12 | * | * | 0.675 |
| Terai Dalit | 49 | (10.3) | (3.8-24.7) |  | 4 | * | * |  | 3 | * | * |  |
| Newar | 79 | 25.3 | (18.4-33.7) |  | 20 | * | * |  | 17 | * | * |  |
| Hill Janajati | 549 | 8.9 | (6.2-12.5) |  | 110 | 87.9 | (74.3-94.8) |  | 100 | 13.8 | (6.3-27.6) |  |
| Terai Janajati | 140 | 3.0 | (1.0-8.7) |  | 4 | * | * |  | 3 | * | * |  |
| Muslim | 22 | * | * |  | 0 | * | * |  | 0 | * | * |  |
| Total | 1,803 | 8.8 | (7.1-10.9) |  | 218 | 85.9 | (77.0-91.7) |  | 190 | 13.9 | (7.0-26.0) |  |

[^51]Table 17.6: Atta Wheat Flour Purchased and Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Atta purchased ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have wheat flour the day of the survey |  |  |  | Observed ${ }^{\text {b }}$ |  |  |  | In original packaging, ${ }^{\text {b }}$, |  |  |  |
|  | N | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | N | \% | (95\% CI) | $\begin{gathered} \mathbf{p}- \\ \text { value } \end{gathered}$ | N | \% | (95\% CI) | pvalue |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 374 | 33.6 | (25.2-43.1) |  | 117 | 96.4 | (92.2-98.3) |  | 110 | 51.1 | (31.9-70.0) |  |
| Central | 349 | 46.3 | (39.1-53.7) |  | 157 | 94.8 | (89.7-97.4) |  | 149 | 55.0 | (35.8-72.8) |  |
| Western | 448 | 53.1 | (43.1-62.8) | $<0.001$ | 239 | 98.0 | (95.7-99.0) | 0.364 | 234 | 63.6 | (51.7-74.1) | 0.002 |
| Mid-western | 324 | 33.9 | (26.5-42.0) |  | 109 | 96.6 | (87.7-99.1) |  | 106 | 74.7 | (65.6-82.0) |  |
| Far-western | 112 | 34.8 | (20.1-53.0) |  | 40 | (100.0) | (0.0-100.0) |  | 40 | (77.0) | (59.6-88.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 210 | 23.5 | (18.5-29.5) |  | 75 | 96.8 | (81.5-99.5) |  | 73 | 78.9 | (61.5-89.8) |  |
| Hill | 647 | 46.4 | (39.1-53.9) | <0.001 | 276 | 95.6 | (91.7-97.7) | 0.484 | 263 | 62.0 | (46.9-75.1) | 0.036 |
| Terai | 750 | 40.8 | (35.2-46.7) |  | 311 | 97.1 | (95.1-98.3) |  | 303 | 55.0 | (44.0-65.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 365 | 52.1 | (45.8-58.4) | <0.001 | 181 | 93.2 | (86.8-96.6) | 0.003 | 171 | 33.6 | (22.6-46.7) | <0.001 |
| Rural | 1,242 | 40.3 | (35.3-45.5) |  | 481 | 97.4 | (95.2-98.6) |  | 468 | 67.0 | (58.2-74.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 224 | 19.7 | (14.1-26.8) |  | 43 | (93.7) | (79.7-98.3) |  | 41 | (83.9) | (69.0-92.4) |  |
| Second | 273 | 37.1 | (31.1-43.5) |  | 90 | 94.7 | (86.9-98.0) |  | 85 | 79.9 | (67.8-88.3) |  |
| Middle | 304 | 43.9 | (35.9-52.2) | <0.001 | 136 | 94.9 | (87.0-98.1) | 0.377 | 130 | 55.6 | (43.6-67.4) | $<0.001$ |
| Fourth | 374 | 37.2 | (30.0-45.1) |  | 153 | 99.0 | (96.1-99.8) |  | 150 | 55.9 | (43.7-67.4) |  |
| Highest | 432 | 55.6 | (48.7-62.2) |  | 240 | 96.5 | (91.7-98.6) |  | 233 | 53.1 | (38.3-67.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 261 | 61.1 | (52.0-69.5) |  | 150 | 96.7 | (92.0-98.7) |  | 145 | 62.5 | (52.1-71.9) |  |
| Hill Chhetri | 352 | 40.0 | (35.0-45.3) |  | 134 | 96.4 | (90.5-98.7) |  | 129 | 71.5 | (61.0-80.2) |  |
| Terai Brahmin/ Chhetri | 30 | (50.9) | (26.6-74.8) |  | 16 | * |  |  | 16 | * |  |  |
| Other Terai caste | 82 | 47.6 | (40.2-55.1) |  | 37 | (90.9) | (86.0-94.2) |  | 34 | (41.1) | (22.7-62.5) |  |
| Hill Dalit | 193 | 33.0 | (25.1-41.9) | <0.001 | 63 | 97.5 | (89.4-99.4) |  | 60 | 62.0 | (39.9-80.1) |  |
| Terai Dalit | 64 | 22.4 | (13.2-35.3) | <0.001 | 15 |  |  | 0.331 | 15 | * |  | $<0.001$ |
| Newar | 105 | 52.5 | (32.3-71.9) |  | 54 | 95.0 | (87.6-98.1) |  | 52 | 32.8 | (13.9-59.5) |  |
| Hill Janajati | 385 | 35.1 | (28.5-42.3) |  | 149 | 96.2 | (92.0-98.2) |  | 144 | 68.3 | (56.0-78.5) |  |
| Terai Janajati | 108 | 32.8 | (24.7-42.0) |  | 34 | (100.0) | (0.0-100.0) |  | 34 | (59.4) | (36.8-78.5) |  |
| Muslim Total | 25 | (40.8) | (13.7-75.0) |  | 8 | * | * |  | 8 | * | * |  |
|  | 1,607 | 42.7 | (38.3-47.3) |  | 662 | 96.3 | (94.4-97.6) |  | 639 | 58.9 | (49.7-67.5) |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly | ly due to | o missin | data |  |  |  |  |  |  |  |  |  |
| Atta purchased: Roller Mill or Large Commercial Chakki Milled Wheat Flour ${ }^{\text {a }}$ Among those who reported household uses this type of wheat P-value obtained from Pearson's chi-square test |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who reported household uses this type of wheat flour and reported they had wheat flour the day of the survey and the wheat flour was observed in the original packaging |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\mathrm{b}}$ Among those who reported they had wheat flour the day of the survey <br> ${ }^{\text {c A Among the }}$ those with observed wheat flour in the original packaging |  |  |  |  |  |  |  |  |  |  |  |  |

Table 17.7: Fortification Statements on Packaging of Purchased Maida Wheat Flour Observed in Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Maida purchased ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Label says fortified with |  |  |  |  |  |
|  |  | Iron |  | Folic acid |  | Vitamin A |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 37 | (0.0) | - | (0.0) | - | (2.7) | (1.7-4.3) |
| Central | 53 | 0.0 | - | 0.0 | - | 0.0 | - |
| Western | 105 | 15.2 | (7.3-29.0) | 14.3 | (6.4-28.9) | 15.2 | (7.3-29.0) |
| Mid-western | 16 | * | * | * | * | * | * |
| Far-western | 7 | * | * | * | * | * | * |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 99 | 15.2 | (7.5-28.1) | 14.1 | (6.5-28.0) | 15.2 | (7.5-28.1) |
| Hill | 73 | 4.1 | (0.6-24.2) | 4.1 | (0.6-24.2) | 5.5 | (1.3-20.9) |
| Terai | 46 | (2.2) | (0.3-14.4) | (2.2) | (0.3-14.4) | (2.2) | (0.3-14.4) |
| Location |  |  |  |  |  |  |  |
| Urban | 47 | (0.0) | - | (0.0) | - | (0.0) | - |
| Rural | 171 | 11.1 | (5.6-20.8) | 10.5 | (5.1-20.6) | 11.7 | (6.2-21.1) |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 11 | * | * | * | * | * | * |
| Second | 25 | (8.0) | (2.8-20.9) | (8.0) | (2.8-20.9) | (8.0) | (2.8-20.9) |
| Middle | 53 | 9.4 | (3.6-22.3) | 9.4 | (3.6-22.3) | 11.3 | (5.2-22.9) |
| Fourth | 58 | 8.6 | (3.6-19.4) | 6.9 | (2.5-17.7) | 8.6 | (3.6-19.4) |
| Highest | 71 | 8.5 | (3.4-19.5) | 8.5 | (3.4-19.5) | 8.5 | (3.4-19.5) |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 22 | * | * | * | * | * | * |
| Hill Chhetri | 32 | (9.4) | (3.6-22.5) | (6.3) | (2.1-17.0) | (9.4) | (3.6-22.5) |
| Terai Brahmin/ Chhetri | 1 | * | * | * | * | * | * |
| Other Terai caste | 11 | * | * | * | * | * | * |
| Hill Dalit | 14 | * | * | * | * | * | * |
| Terai Dalit | 4 | * | * | * | * | * | * |
| Newar | 20 | * | * | * | * | * | * |
| Hill Janajati | 110 | 10.9 | (4.1-25.8) | 10.9 | (4.1-25.8) | 11.8 | (4.9-25.9) |
| Terai Janajati | 4 | * | * | * | * | * | * |
| Muslim | - | - | - | - | - | - | - |
|  | 218 | 8.7 | (4.3-16.8) | 8.3 | (3.9-16.7) | 9.2 | (4.7-17.0) |

[^52]Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Maida purchased: roller mill refined wheat flour
Significant test did not perform due to small sample size.
${ }^{\text {a }}$ Among those who reported household uses this type of wheat flour and reported they had wheat flour the day of the survey and the wheat flour was observed in the original packaging

Table 17.8: Fortification Statements on Packaging of Purchased Atta Wheat Flour Observed in Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Atta purchased ${ }^{\text {a }}$ |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Label says fortified with |  |  |  |  |  |  |
|  |  | Iron |  | Folic acid |  | Vitamin A |  |  |
|  |  | \% (95\% CI) | p-value | \% (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{array}{r} 117 \\ 157 \\ 239 \\ 109 \\ 40 \end{array}$ | 35.9 $(23.6-50.4)$ <br> 19.1 $(10.8-31.6)$ <br> 49.4 $(42.0-56.8)$ <br> 62.4 $(54.6-69.6)$ <br> $(77.5)$ $(60.8-88.4)$ | <0.001 | 28.2 $(18.0-41.3)$ <br> 12.7 $(8.1-19.4)$ <br> 48.5 $(41.4-55.7)$ <br> 59.6 $(51.8-67.0)$ <br> $(67.5)$ $(43.2-85.0)$ | <0.001 | $\begin{array}{r} 29.9 \\ 14.0 \\ 49.0 \\ 59.6 \\ (70.0) \end{array}$ | $\begin{array}{r} (20.7-41.1) \\ (8.2-23.0) \\ (41.8-56.2) \\ (51.8-67.0) \\ (46.7-86.2) \end{array}$ | $<0.001$ |
| Ecological Region <br> Mountain <br> Hill <br> Terai | 75 276 311 | 60.0 $(46.8-71.9)$ <br> 42.8 $(36.2-49.5)$ <br> 40.5 $(32.6-48.9)$ | 0.009 | $\begin{array}{ll} 54.7 & (41.3-67.4) \\ 38.8 & (33.7-44.1) \\ 36.3 & (28.9-44.5) \end{array}$ | 0.014 | $\begin{aligned} & 58.7 \\ & 40.6 \\ & 35.7 \end{aligned}$ | $\begin{aligned} & (45.7-70.6) \\ & (34.8-46.6) \\ & (28.7-43.4) \end{aligned}$ | 0.001 |
| Location <br> Urban <br> Rural | 181 481 | $\begin{array}{ll} 29.3 & (20.5-40.0) \\ 49.1 & (42.8-55.3) \\ \hline \end{array}$ | <0.001 | $\begin{aligned} & 28.2 \text { (19.1-39.5) } \\ & 43.7 \text { (38.0-49.5) } \end{aligned}$ | <0.001 | $\begin{array}{r} 28.2 \\ 44.9 \\ \hline \end{array}$ | $\begin{aligned} & (19.4-39.0) \\ & (39.2-50.8) \\ & \hline \end{aligned}$ | <0.001 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | 27 68 116 164 287 | $(77.8)$ $(60.8-88.8)$ <br> 63.2 $(51.0-74.0)$ <br> 46.6 $(36.8-56.5)$ <br> 48.8 $(40.4-57.2)$ <br> 31.7 $(26.0-38.1)$ | <0.001 | $(70.4)$ $(53.5-83.1)$ <br> 58.8 $(46.1-70.4)$ <br> 41.4 $(32.7-50.7)$ <br> 45.1 $(37.1-53.4)$ <br> 27.9 $(22.8-33.6)$ | <0.001 | $\begin{array}{r} (66.7) \\ 58.8 \\ 40.5 \\ 47.0 \\ 29.6 \end{array}$ | $\begin{aligned} & (50.7-79.6) \\ & (46.4-70.2) \\ & (32.1-49.5) \\ & (39.0-55.1) \\ & (24.2-35.6) \end{aligned}$ | <0.001 |
| Ethnicity Hill Brahmin Hill Chhetri Terai Brahmin/Chhetri Other Terai caste Hill Dalit Terai Dalit Newar Hill Janajati Terai Janajati Muslim | 150 134 16 37 63 15 54 149 34 8 | 47.3 $(39.0-55.8)$ <br> 53.7 $(44.1-63.1)$ <br> $*$ $*$ <br> $(8.1)$ $(2.4-23.9)$ <br> 47.6 $(31.2-64.6)$ <br> $*$ $*$ <br> 14.8 $(6.9-29.1)$ <br> 51.7 $(43.7-59.6)$ <br> $(47.1)$ $(28.3-66.7)$ <br> $*$ $*$ | $<0.001$ | 42.0 $(34.3-50.1)$ <br> 52.2 $(42.1-62.2)$ <br> $*$ $*$ <br> $(5.4)$ $(1.3-20.3)$ <br> 44.4 $(28.5-61.6)$ <br> $*$ $*$ <br> 9.3 $(3.7-21.1)$ <br> 47.7 $(39.8-55.7)$ <br> $(44.1)$ $(26.3-63.5)$ <br> $*$ $*$ | $<0.001$ | $\begin{array}{r} 43.3 \\ 53.7 \\ * \\ (2.7) \\ 44.4 \\ * \\ 13.0 \\ 49.0 \\ (44.1) \\ * \end{array}$ | $(35.6-51.4)$ $(43.6-63.6)$ $*$ $(0.4-17.5)$ $(28.5-61.6)$ $*$ $(5.9-26.3)$ $(41.0-57.1)$ $(26.3-63.5)$ $*$ | $<0.001$ |
| Total | 662 | 43.7 (38.8-48.6) |  | 39.4 (35.0-44.0) |  |  | (36.0-44.8) |  |
| Note: Both Ns and estimates are unweighted. <br> Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> Atta purchased: Roller Mill or Large Commercial Chakki Milled Wheat Flour <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Among those who reported household uses this type of wheat flour and reported they had wheat flour the day of the survey and the wheat flour was observed in the original packaging |  |  |  |  |  |  |  |  |

Table 17.9: Wheat Flour Samples Collected and Presence of Iron assessed by the Iron Spot Test, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Tested positive for fortification using iron spot test ${ }^{\text {a }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Maida purchased |  |  |  | Atta purchased |  |  |  |
|  | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |
| Eastern | 21 | * | * |  | 85 | 41.2 | (24.6-60.1) |  |
| Central | 19 | * | * |  | 132 | 31.1 | (24.5-38.5) |  |
| Western | 71 | (18.3) | (9.6-32.2) | - | 193 | 44.0 | (36.4-52.0) | 0.002 |
| Mid-western | 6 | * | * |  | 90 | 21.1 | (14.0-30.5) |  |
| Far-western | 1 | * | * |  | 35 | (28.6) | (11.8-54.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 68 | 16.2 | (7.6-31.0) |  | 56 | 41.1 | (34.1-48.4) |  |
| Hill | 40 | (22.5) | (13.1-35.9) | - | 233 | 39.5 | (31.2-48.4) | 0.079 |
| Terai | 10 | * | * |  | 246 | 30.5 | (23.3-38.7) |  |
| Location |  |  |  |  |  |  |  |  |
| Urban | 12 | * | * |  | 152 | 29.8 | (21.7-39.4) | 0.08 |
| Rural | 106 | 17.0 | (10.0-27.4) |  | 383 | 37.8 | (31.3-44.7) | 083 |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 5 | * | * |  | 21 | * | * |  |
| Second | 15 | * | * |  | 54 | 40.7 | (28.9-53.7) |  |
| Middle | 31 | (22.6) | (13.0-36.3) | - | 84 | 27.4 | (18.7-38.2) | 0.174 |
| Fourth | 39 | (10.3) | (3.4-26.8) |  | 130 | 32.3 | (25.0-40.7) |  |
| Highest | 28 | (32.1) | (18.1-50.4) |  | 246 | 39.0 | (32.4-46.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 5 | * | * |  | 125 | 48.0 | (38.9-57.2) |  |
| Hill Chhetri | 15 | * | * |  | 109 | 33.9 | (24.0-45.5) |  |
| Terai Brahmin/Chhetri | 0 | - | - |  | 12 | * | * |  |
| Other Terai caste | 2 | * | * |  | 23 | * | * |  |
| Hill Dalit | 7 | * | * |  | 58 | 31.0 | (18.3-47.5) | 0.071 |
| Terai Dalit | 0 | - | - | - | 9 | * | * | 0.071 |
| Newar | 9 | * | * |  | 49 | (36.7) | (26.4-48.4) |  |
| Hill Janajati | 77 | 22.1 | (11.3-38.7) |  | 114 | 31.6 | (21.8-43.4) |  |
| Terai Janajati | 3 | * | * |  | 28 | (46.4) | (29.0-64.8) |  |
| Muslim | 0 | - | - |  | 6 | * | * |  |
| Total | 118 | 19.5 | (12.6-29.0) |  | 535 | 35.5 | (30.5-40.9) |  |

[^53]Table 17.10: Mean Iron Content in Household Samples of Purchased Wheat Flour (Maida and Atta), Assessed by AOAC International Official Method, and among those Tested Positive in Iron Spot Test, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Iron content in All wheat flour samples $\mathrm{mg} / \mathrm{kg}$, ${ }^{\text {a }}$ <br> (Quantitative Test) |  |  | Iron in all purchased wheat flour samples among those tested positive in iron spot test, $\mathrm{mg} / \mathrm{kg}^{\mathrm{a}}$ <br> (Qualitative Test) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | N | Mean | Standard Error | N | Mean | Standard Error |
| Development Region |  |  |  |  |  |  |
| Eastern | 128 | 61.9 | 3.0 | 37 | (87.9) | (2.8) |
| Central | 206 | 57.7 | 1.9 | 51 | 78.9 | 3.0 |
| Western | 303 | 50.1 | 2.1 | 101 | 73.1 | 4.0 |
| Mid-western | 130 | 46.4 | 2.8 | 25 | (76.6) | (7.1) |
| Far-western | 176 | 62.3 | 2.6 | 12 | * | * |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 163 | 49.9 | 2.8 | 40 | (74.5) | (5.0) |
| Hill | 395 | 57.4 | 1.8 | 104 | 75.4 | 3.2 |
| Terai | 385 | 55.0 | 1.5 | 82 | 78.6 | 3.8 |
| Location |  |  |  |  |  |  |
| Urban | 206 | 50.3 | 2.5 | 51 | 80.3 | 5.3 |
| Rural | 737 | 56.5 | 1.2 | 175 | 75.2 | 2.4 |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 113 | 71.8 | 3.2 | 11 | * | * |
| Second | 124 | 60.8 | 3.1 | 27 | (83.0) | (6.1) |
| Middle | 167 | 52.7 | 2.6 | 32 | (73.0) | (6.0) |
| Fourth | 223 | 47.9 | 2.1 | 49 | (69.5) | (4.6) |
| Highest | 316 | 53.3 | 1.8 | 107 | 78.0 | 3.1 |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 172 | 59.4 | 2.6 | 62 | 76.2 | 4.6 |
| Hill Chhetri | 234 | 57.5 | 2.3 | 45 | (76.4) | (4.9) |
| Terai Brahmin/Chhetri | 20 | * | * | 3 | * | * |
| Other Terai caste | 53 | 67.7 | 3.7 | 5 | * | * |
| Hill Dalit | 100 | 50.3 | 3.2 | 21 | * | * |
| Terai Dalit | 22 | * | * | 2 | * | * |
| Newar | 61 | 51.4 | 3.4 | 20 | * | * |
| Hill Janajati | 222 | 47.7 | 2.3 | 54 | 73.3 | 4.1 |
| Terai Janajati | 43 | (51.3) | (3.8) | 13 | * | * |
| Muslim | 13 | * | * | 1 | * | * |
| Total | 943 | 55.1 | 1.1 | 226 | 76.4 | 2.2 |

[^54]Table 17.11: Iron Content in All Purchased Wheat Flour Samples (Maida and Atta), Assessed by AOAC International Official Method, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Iron in All Purchased Wheat Flour, mg/kg ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | <30 |  |  | 30-39.9 |  |  | 40-49.9 |  |  | 50-59.9 |  |  |
|  |  | \% | (95\% CI) | $\begin{gathered} \hline \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} p- \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Development |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 128 | 14.8 | (6.6-29.9) |  | 12.5 | (5.8-24.7) |  | 14.8 | (7.7-26.8) |  | 10.9 | (5.8-19.7) |  |
| Central | 206 | 15.5 | (9.9-23.6) |  | 14.1 | (10.2-19.2) |  | 17.5 | (12.8-23.5) |  | 8.7 | (5.6-13.4) |  |
| Western | 303 | 29.4 | (22.2-37.7) | <0.001 | 14.5 | (11.4-18.3) | 0.732 | 16.2 | (12.2-21.1) | 0.761 | 11.2 | (8.0-15.5) | 0.674 |
| Mid-western | 130 | 37.7 | (25.3-51.9) |  | 13.1 | (8.8-19.0) |  | 13.1 | (7.6-21.6) |  | 11.5 | (7.3-17.8) |  |
| Far-western | 176 | 14.2 | (7.3-25.9) |  | 10.2 | (5.3-18.9) |  | 18.2 | (11.8-26.9) |  | 13.6 | (9.6-19.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 163 | 38.0 | (27.4-49.9) |  | 12.9 | (8.3-19.5) |  | 7.4 | (3.6-14.5) |  | 9.2 | (5.0-16.2) |  |
| Hill | 395 | 20.5 | (14.3-28.5) | <0.001 | 10.9 | (8.1-14.5) | 0.151 | 18.2 | (14.2-23.1) | 0.003 | 10.9 | (8.4-14.0) | 0.580 |
| Terai | 385 | 18.4 | (13.2-25.2) |  | 15.6 | (11.9-20.2) |  | 17.9 | (13.6-23.3) |  | 12.2 | (9.1-16.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 206 | 33.5 | (23.5-45.2) | 0 | 8.3 | (5.7-11.9) | 0.019 | 18.4 | (12.4-26.5) |  | 8.3 | (4.5-14.7) |  |
| Rural | 737 | 19.7 | (15.9-24.2) | . 001 | 14.5 | (11.9-17.6) | 0.019 | 15.6 | (12.9-18.7) | 0.328 | 11.9 | (9.8-14.5) | 0.137 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 113 | 9.7 | (5.3-17.3) |  | 3.5 | (1.5-8.0) |  | 12.4 | (6.1-23.6) |  | 15.9 | (11.4-21.9) |  |
| Second | 124 | 15.3 | (10.6-21.6) |  | 16.9 | (11.9-23.6) |  | 13.7 | (9.3-19.7) |  | 9.7 | (5.7-15.9) |  |
| Middle | 167 | 23.4 | (16.6-31.8) | <0.001 | 15.0 | (10.3-21.2) | 0.023 | 19.2 | (13.8-25.9) | 0.472 | 13.8 | (10.1-18.6) | 0.245 |
| Fourth | 223 | 30.9 | (24.4-38.4) |  | 13.9 | (10.1-18.8) |  | 15.2 | (11.0-20.8) |  | 10.3 | (7.0-14.9) |  |
| Highest | 316 | 24.1 | (17.5-32.1) |  | 13.6 | (10.4-17.6) |  | 17.7 | (13.4-23.1) |  | 9.2 | (6.2-13.4) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 172 | 15.7 | (9.8-24.2) |  | 16.3 | (10.9-23.6) |  | 18.0 | (13.2-24.1) |  | 9.3 | 6.1-13.9) |  |
| Hill Chhetri | 234 | 21.8 | (14.7-31.1) |  | 10.3 | (7.3-14.3) |  | 17.5 | (12.5-24.0) |  | 11.1 | 8.2-14.9) |  |
| Terai |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Brahmin/Chhetri | 20 | * | * |  | * | * |  | * | * |  | * | * |  |
| Other Terai caste | 53 | 7.5 | (4.3-12.9) |  | 3.8 | (0.8-15.2) |  | 17.0 | (7.6-33.9) |  | 9.4 |  |  |
| Hill Dalit | 100 | 27.0 | (19.2-36.5) | <0.001 | 15.0 | (8.9-24.2) | 0.154 | 16.0 | (9.8-25.0) | 0.547 | 10.0 | 5.7-17.1) | 0.976 |
| Terai Dalit | 22 | * | * |  | * | * |  | * | * |  | * | * |  |
| Newar | 61 | 21.3 | (10.2-39.1) |  | 18.0 | (11.4-27.3) |  | 14.8 | (8.0-25.5) |  | 13.1 | 7.0-23.2) |  |
| Hill Janajati | 222 | 34.2 | (25.7-43.9) |  | 14.9 | (10.4-20.8) |  | 11.3 | (7.6-16.5) |  | 11.7 | 8.3-16.3) |  |
| Terai Janajati | 43 | (23.3) | (11.4-41.7) |  | (11.6) | (4.8-25.5) |  | (18.6) | (11.4-28.9 |  | (9.3) | (3.4-22.8) |  |
| Muslim | 13 | * | * |  | * | * |  | * | * |  | * | * |  |
| Total | 943 | 22.7 | (18.6-27.4) |  | 13.1 | (10.9-15.7) |  | 16.2 | (13.6-19.2) |  | 11.1 | (9.2-13.4) |  |

[^55]Table 17.11: Cont'd...

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
a AOAC International Official Method 999.11 Standard method for quantitatively det
spot test and among a random subset of those that tested negative with iron spot test.
bNepal's Food Standard for wheat flour is a minimum of $60 \mathrm{mg} / \mathrm{kg}$ iron.

Table 17.12: Mean Iron Content in Household Samples of Purchased Maida Flour, Assessed by AOAC International Official Method, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Iron in All wheat flour samples mg/kg ${ }^{\text {a }}$ |  |
| :---: | :---: | :---: | :---: |
|  |  | Mean | Standard Error |
| Development Region |  |  |  |
| Eastern | 21 | * | * |
| Central | 20 | * | * |
| Western | 72 | 28.1 | 2.6 |
| Mid-western | 6 | * | * |
| Far-western | 1 | * | * |
| Ecological Region |  |  |  |
| Mountain | 69 | 30.3 | 3.0 |
| Hill | 40 | (30.0) | (4.3) |
| Terai | 11 | * | * |
| Location |  |  |  |
| Urban | 12 | * | * |
| Rural | 108 | 31.0 | 2.4 |
| Wealth Quintile |  |  |  |
| Lowest | 5 | * | * |
| Second | 15 | * | * |
| Middle | 32 | (30.4) | (4.0) |
| Fourth | 40 | (26.3) | (3.2) |
| Highest | 28 | (37.6) | (5.3) |
| Ethnicity |  |  |  |
| Hill Brahmin | 5 | * | * |
| Hill Chhetri | 16 | * | * |
| Other Terai caste | 3 | * | * |
| Hill Dalit | 7 | * | * |
| Newar | 9 | * | * |
| Hill Janajati | 77 | 31.8 | 3.0 |
| Terai Janajati | 3 | * | * |
|  | 120 | 32.2 | 2.4 |

Note: Both Ns and estimates are unweighted.
Sample size might vary slightly due to missing data.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Figures in parentheses are based on 25-49 unweighted cases.
${ }^{\text {a Analyzed by AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry asking and }}$ flame atomic absorption spectrometry (FASS)

Table 17.13: Iron Content in All Purchased Maida Flour, Assessed by AOAC International Official Method, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Iron in Maida Purchased Wheat Flour, mg/kg ${ }^{\text {a }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | <30 |  | 30-39.9 |  | 40-49.9 |  | 50-59.9 |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  | * | * | * |
| Central | 20 | * | * | * | * | * | * | * | * |
| Western | 72 | 68.1 | (59.1-75.8) | 15.3 | 9.4-23.9 | 4.2 | (0.8-19.3) | 4.2 | (1.9-8.9) |
| Mid-western | 6 | * | * | * | * | * | * | * | * |
| Far-western | 1 | * | * | * | * | * | * | * | * |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 69 | 63.8 | (53.1-73.3) | 17.4 | (11.4-25.6) | 4.3 | (0.8-20.3) | 5.8 | (3.1-10.6) |
| Hill | 40 | (67.5) | (54.3-78.4) | (7.5) | (5.3-10.5) | (7.5) | (5.3-10.5) | (5.0) | (1.5-15.4) |
| Terai | 11 | * | * | * | * | * | * | * | * |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 12 | * | * | * | * | * | * | * | * |
| Rural | 108 | 63.9 | (54.6-72.2) | 13.9 | (9.2-20.4) | 4.6 | (1.6-12.3) | 5.6 | (3.1-9.7) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 5 | * | * | * | * | * | * | * | * |
| Second | 15 | * | * | * | * | * | * | * |  |
| Middle | 32 | (62.5) | (45.3-77.0) | (18.8) | (9.4-33.8) | (0.0) | - | (9.4) | (4.4-18.8) |
| Fourth | 40 | (70.0) | (59.7-78.6) | (12.5) | (7.4-20.3) | (5.0) | (1.5-15.8) | (2.5) | (0.3-19.1) |
| Highest | 28 | (50.0) | (33.3-66.7) | (10.7) | (4.6-23.1) | (14.3) | (7.6-25.2) | (7.1) | (1.5-28.5) |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 5 | * | * | * | * | * | * | * | * |
| Hill Chhetri | 16 | * | * | * | * | * | * | * | * |
| Other Terai caste | 3 | * | * | * | * | * | * | * |  |
| Hill Dalit | 7 | * | * | * | * | * | * | * |  |
| Newar | 9 | * | * | * | * | * | * | * | * |
| Hill Janajati | 77 | 59.7 | (47.9-70.6) | 14.3 | (9.3-21.4) | 9.1 | (3.9-20.0) | 5.2 | (2.9-9.1) |
| Terai Janajati | 3 | * | * | * | * | * | * | * | * |
| Total | 120 | 61.7 | (53.7-69.1) | 13.3 | (9.2-18.9) | 5.8 | (2.7-12.2) | 5.8 | (3.2-10.3) |
| Note: Both Ns and estimates are unweighted. |  |  |  |  |  |  |  |  |  |
| Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data |  |  |  |  |  |  |  |  |  |
| Maida purchased: roller mill refined wheat flour |  |  |  |  |  |  |  |  |  |
| Significant test did not perform due to small sample size. |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry ash and flame atomic absorption spectrometry (FASS). AOAC methods tested among those with positive iron spot test and among a random subset of those that tested negative with iron spot test. |  |  |  |  |  |  |  |  |  |

Table 17.13: Cont'd

| Characteristics | N | Iron in Maida Purchased Wheat Flour, mg/kg ${ }^{\text {a }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 60-69.9 |  | 70-79.9 |  | $\geq 80$ |  | $\geq 60^{\text {b }}$ |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |
| Eastern | 21 | * | * | * | * | * | * | * | * |
| Central | 20 | * | * | * | * | * | * | * | * |
| Western | 72 | 2.8 | (0.5-13.5) | 1.4 | (0.2-11.6) | 4.2 | (1.6-10.7) | 8.3 | (3.7-17.5) |
| Mid-western | 6 | * |  | * |  | * | * | * | * |
| Far-western | 1 | * | * | * | * | * | * | * | * |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 69 | 2.9 | (0.5-14.1) | 1.4 | (0.2-12.1) | 4.3 | (1.3-13.8) | 8.7 | (3.6-19.7) |
| Hill | 40 | (2.5) | (0.3-17.8) |  |  | (10.0) | (7.1-14.0) | (12.5) | (7.7-19.7) |
| Terai | 11 | * | * | * | * | * | * | * | * |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 12 | * | * | * | * | * | * | * | * |
| Rural | 108 | 4.6 | (1.8-11.4) | (1.9) | (0.4-8.3) | 5.6 | (2.9-10.3) | 12.0 | (7.0-19.8) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 5 | * | * | * | * | * | * | * | * |
| Second | 15 | * | * | * | * | * | * | * | * |
| Middle | 32 | (3.1) | (0.3-22.9) | (3.1) | (0.3-22.9) | (3.1) | (0.3-24.1) | (9.4) | (2.4-29.9) |
| Fourth | 40 | (7.5) | (2.2-22.4) | (0.0) | - | (2.5) | (1.9-3.3) | (10.0) | (4.0-22.7) |
| Highest | 28 | (3.6) | (0.4-24.9) | (3.6) | (0.5-22.9) | (10.7) | (7.9-14.4) | (17.9) | (10.2-29.3) |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 5 | * | * | * | * | * | * | * | * |
| Hill Chhetri | 16 | * | * | * | * | * | * | * | * |
| Other Terai caste | 3 | * | * | * | * | * | * | * | * |
| Hill Dalit | 7 | * | * | * | * | * | * | * | * |
| Newar | 9 | * | * | * | * | * | * | * | * |
| Hill Janajati | 77 | 3.9 | (1.1-13.3) | 1.3 | (0.1-11.2) | 6.5 | (3.3-12.5) | 11.7 | (5.8-22.2) |
| Terai Janajati | 3 | * | * | * | * | * | * | * | * |
| Total | 120 | 5.0 | (2.1-11.5) | 1.7 | (0.4-7.5) | 6.7 | (4.1-10.6) | 13.3 | (8.7-19.8) |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Maida purchased: roller mill refined wheat flour.
Significant test did not perform due to small sample size.
${ }^{\text {a }}$ AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry ash and flame atomic absorption spectrometry (FASS). AOAC methods tested among those with positive iron spot test and among a random subset of those that tested negative with iron spot test.
${ }^{\text {b }}$ Nepal's Food Standard for wheat flour is a minimum of $60 \mathrm{mg} / \mathrm{kg}$ iron.

Table 17.14: Mean Iron Content in Household Samples of Purchased Atta Flour, Assessed by AOAC International Official Method, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Iron in All atta samples mg/kg ${ }^{\text {a }}$ |  |
| :---: | :---: | :---: | :---: |
|  |  | Mean | Standard Error |
| Development Region |  |  |  |
| Eastern | 96 | 67.2 | 2.8 |
| Central | 136 | 56.4 | 2.3 |
| Western | 208 | 55.9 | 2.5 |
| Mid-western | 94 | 40.8 | 2.7 |
| Far-western | 36 | (34.7) | (3.4) |
| Ecological Region |  |  |  |
| Mountain | 57 | 49.2 | 3.4 |
| Hill | 247 | 53.7 | 2.1 |
| Terai | 266 | 55.5 | 1.9 |
| Location |  |  |  |
| Urban | 164 | 49.9 | 3.0 |
| Rural | 406 | 55.8 | 1.4 |
| Wealth Quintile |  |  |  |
| Lowest | 22 | * | * |
| Second | 59 | 60.2 | 3.5 |
| Middle | 91 | 53.7 | 3.3 |
| Fourth | 144 | 51.1 | 2.7 |
| Highest | 254 | 54.9 | 2.1 |
| Ethnicity |  |  |  |
| Hill Brahmin | 133 | 58.1 | 2.9 |
| Hill Chhetri | 113 | 48.6 | 3.0 |
| Terai Brahmin/Chhetri | 12 | * | * |
| Other Terai caste | 27 | (66.6) | (5.2) |
| Hill Dalit | 60 | 43.9 | 3.2 |
| Terai Dalit | 14 | * | * |
| Newar | 49 | (52.9) | (3.6) |
| Hill Janajati | 124 | 55.2 | 3.1 |
| Terai Janajati | 29 | (56.3) | (5.2) |
| Muslim | 7 | * | * |
| Total | 570 | 54.1 | 1.3 |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Analyzed by AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry asking and flame atomic absorption spectrometry (FASS)

Table 17.15: Iron Content in All Purchased Atta Flour, Assessed by AOAC International Official Method, Nepal National Micronutrient Status Survey, 2016


[^56]Table 17.15: Cont'd...

| Characteristics | N | Iron in Atta Purchased Wheat Flour, mg/kg ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 60-69.9 |  |  | 70-79.9 |  |  | $\geq 80$ |  |  | $\geq 60^{\text {b }}$ |  |  |
|  |  | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 96 | 6.3 | (3.7-10.3) |  | 8.3 | (4.5-15.0) |  |  | (19.5-61.8) |  |  | (30.8-74.3) |  |
| Central | 136 | 11.0 | (7.1-16.7) |  | 11.8 | (7.9-17.1) |  | 20.6 | (14.7-28.1) |  | 43.4 | (35.8-51.2) |  |
| Western | 208 | 11.1 | (6.8-17.6) | 0.199 | 7.7 | (4.9-11.8) | 0.445 | 15.9 | (12.1-20.6) | $<0.001$ | 34.6 | (26.6-43.6) | 0.001 |
| Mid-western | 94 | 5.3 | (2.4-11.3) |  | 5.3 | (2.8-9.8) |  | 8.5 | (5.2-13.6) |  | 19.1 | (12.7-27.7) |  |
| Far-western | 36 | (2.8) | (0.6-11.3) |  | (5.6) | (1.1-23.9) |  | (2.8) | (0.6-11.3) |  | (11.1) | (5.3-21.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 57 | 7.0 | (3.6-13.3) |  | 10.5 | (5.4-19.6) |  | 14.0 | (9.0-21.2) |  | 31.6 | (23.7-40.7) |  |
| Hill | 247 | 9.7 | (5.9-15.7) | 0.749 | 6.9 | (4.5-10.3) | 0.546 | 17.4 | (12.0-24.6) | 0.359 | 34.0 | (25.7-43.4) | 0.464 |
| Terai | 266 | 8.3 | (5.8-11.6) |  | 9.0 | (6.2-12.9) |  | 21.1 | (14.4-29.6) |  | 38.3 | (29.9-47.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 164 | 6.7 | (3.8-11.5) | 0.268 | 7.3 | (4.5-11.7) |  | 17.7 | (11.3-26.6) |  | 31.7 | (23.2-41.6) |  |
| Rural | 406 | 9.6 | (6.8-13.3) | 0.268 | 8.6 | (6.4-11.6) | 0.608 | 19.2 | (14.5-25.1) | 0.672 | 37.4 | (30.7-44.7) | 0.196 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 22 | * | * |  | * | * |  | * | * |  | * | * |  |
| Second | 59 | 8.5 | (3.9-17.5) |  | 8.5 | (3.6-18.6) |  | 25.4 | (15.8-38.3) |  | 42.4 | (28.5-57.6) |  |
| Middle | 91 | 7.7 | (2.8-19.4) | 0.897 | 3.3 | (1.4-7.8) | 0.322 | 16.5 | (9.7-26.6) | 0.086 | 27.5 | (18.0-39.5) | 0.077 |
| Fourth | 144 | 10.4 | (6.6-16.0) |  | 8.3 | (4.8-14.0) |  | 13.2 | (8.8-19.2) |  | 31.9 | (24.9-39.9) |  |
| Highest | 254 | 8.7 | (5.8-12.7) |  | 9.4 | (6.4-13.8) |  | 22.0 | (16.5-28.9) |  | 40.2 | (33.2-47.5) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 133 |  | (6.2-15.0) |  | 7.5 | (4.0-13.6) |  |  | (15.7-33.1) |  | 40.6 | (31.0-50.9) |  |
| Hill Chhetri | 113 | 4.4 | (1.8-10.2) |  | 6.2 | (2.8-13.3) |  | 16.8 | (10.9-25.0) |  | 27.4 | (18.9-38.1) |  |
| Terai Brahmin/Chhetri | 12 |  |  |  |  | * |  |  | * |  | * | * |  |
| Other Terai caste | 27 | (11.1) | (5.6-20.9) |  | (22.2) | (11.6-38.3) |  | (22.2) | (9.9-42.6) |  | (55.6) | (40.6-69.5) |  |
| Hill Dalit | 60 | 15.0 | (8.3-25.6) |  | 1.7 | (0.3-10.0) |  | 6.7 | (2.6-15.8) |  | 23.3 | (14.3-35.8) |  |
| Terai Dalit | 14 |  |  | 0.302 |  |  | 0.049 |  |  | 0.192 |  |  | 0.010 |
| Newar | 49 | (8.2) | (2.6-22.7) |  | (10.2) | (5.7-17.6) |  | (18.4) | (9.4-32.7) |  | (36.7) | (22.3-54.0) |  |
| Hill Janajati | 124 | 7.3 | (3.7-13.7) |  | 8.9 | (5.5-14.0) |  |  | (11.8-28.0) |  | 34.7 | (25.0-45.8) |  |
| Terai Janajati | 29 | (13.8) | (4.7-34.4) |  | (13.8) | (5.1-32.4) |  | (24.1) | (11.1-44.7) |  | (51.7) | (35.4-67.7) |  |
| Muslim | 7 | * | * |  | * | * |  | * | * |  | * | * |  |
| Total | 570 | 8.8 | (6.5-11.7) |  | 8.2 | (6.4-10.6) |  | 18.8 | (14.7-23.7) |  | 35.8 | (30.3-41.7) |  |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Atta purchased: Roller Mill or Large Commercial Chakki Milled Wheat Flour
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry ash and flame atomic absorption spectrometry (FASS). AOAC methods tested among those with positive iron spot test and among a random subset of those that tested negative with iron spot test.
${ }^{\mathrm{b}}$ Nepal's Food Standard for wheat flour is a minimum of $60 \mathrm{mg} / \mathrm{kg}$ iron.

## Household Purchase of Other Fortifiable Food

 VehicleThis chapter presents information on household purchasing patterns of potentially fortifiable foods (cooking oil, rice), or foods primarily composed of fortifiable ingredients (e.g. wheat flour in noodles, biscuits/cookies). Noodles and biscuits/cookies were included to examine intake and whether fortified wheat flour is reaching households through processed foods like noodles and biscuits/cookies. Also, enumerators observed the food packaging for labels and logos identifying whether any of the foods were already fortified.

### 18.1 Households Purchasing and Consumption Patterns of Noodles

Commonly consumed noodles in Nepal are made of wheat flour. Almost all (95 percent) households reported consuming any kind of noodles in or outside of the home. However, seven percent could show them to the enumerator in the household on the day of the survey. Virtually all the noodles observed in the household were in the original packaging (Table 18.1). Among the noodles observed in the original packaging, 27 percent had a label saying fortified with "iron", four percent stated fortified with "folic acid" and 43 percent with "vitamin A" (Table 18.2). There are no standards in Nepal for the labeling requirements of foods with fortified ingredients. The estimated per capita availability of noodles was 4.7 gram per day (Table 18.3).

### 18.2 Households Purchasing and Consumption Patterns of Cooking Oil

Virtually all households participating in the survey reported using cooking oil to prepare foods (Table 18.4). The main type of cooking oil reported was mustard oil ( 66 percent) followed by sunflower oil (24 percent) and soybean oil (nine percent) (Table 18.5). The proportion of households using mustard oil as the main oil ranged from 56 percent in the Central region to 88 percent in the Far-western region. It was 57 percent, 60 percent and 72 percent, respectively, in the Mountain, Hill and Terai. Higher proportion of households in rural areas reported using mustard oil than urban areas ( 69 percent versus 47 percent). The proportion of households using mustard oil significantly decreases with increasing wealth quintile ( 79 percent among the lowest quintile to 45 percent among the highest quintile). The proportion of households reporting they use sunflower oil as the main oil ranged from seven percent in the Far-western region to 31 percent in the Eastern region. Sixteen percent in the Mountain, 28 percent in Hill and 22 percent in the Terai use sunflower oil as the main cooking oil. Sunflower oil was reported by a higher proportion of households in urban areas than rural areas ( 39 percent versus 22 percent). Households using sunflower oil increases with increasing wealth quintile. Ten percent in the lowest quintile use sunflower oil compared to 45 percent in the highest wealth quintile. The proportion of households consuming soybean oil ranged from four percent in the Farwestern region to 14 percent in the Central region. Higher proportion of households in the Mountain region consumed soybean oil (26 percent) than in the Hill (12 percent) and Terai (four percent), and higher proportion of households in urban (13 percent) than rural (nine percent) areas consumed it. By wealth quintile, the proportion of households consuming soybean oil varied from six percent in the Middle quintile to 11 percent in the fourth wealth quintile group.

The per-capita availability of mustard oil was 23.8 gram per day, sunflower oil was 25.0 gram per day and soybean oil was 22.2 gram per day. The per-capita availability of any type of oil was 22.2 gram per day (Table 18.6).

Among those reporting they had mustard oil the day of the survey, enumerators observed the oil in virtually all households. The majority of the mustard oil was potentially fortifiable in that it was not homemade ( 85 percent) (Table 18.7), compared to self-made, or unknown. Almost all ( 98 percent) households had mustard oil available for observation in the home, but only 44 percent were in the original packaging. A little over half ( 60 percent) of households used a Nepali brand of mustard oil while 40 percent reported using an Indian brand (Table 18.8).

Among the households using sunflower oil, almost all were potentially fortifiable as they were not made at home and were purchased (Table 18.9). Almost all (97 percent) households had sunflower oil available for observation in the home and among those 45 percent was in the original packaging. Among the sunflower oil observed in the household and in the original packaging, the majority of the households (89 percent) reported using a Nepali brand of sunflower oil while nine percent used an Indian brand (Table 18.10). Among those who primarily used soybean oil, almost all households (99 percent) had it available and it was observed the day of the survey. Almost all was potentially fortifiable in that it was not homemade (Table 18.11). All households had soybean oil available for observation in the home, but only 52 percent were in original packaging (Table 18.11). Among the households who use soybean oil and had it available in the original packaging the day of the survey, 14 percent reported using an Indian brand while 86 percent used a Nepali brand (Table 18.12).

### 18.3 Households Purchasing and Consumption Patterns of Rice

Households were asked about their rice sources, and allowed to choose more than one option (Table 18.13). Half of households reported purchasing rice milled in small local mills, while 13 percent used rice pounded at the household level. Reported use of home produced handpounded rice was most common in the Far-western region (33 percent) and least common in the Central region (seven percent). One-third of households in the Mountain, 13 percent in Terai and 10 percent in the Hill region used hand pounded rice. Almost double the households in rural areas compared to urban areas used this type of rice ( 14 percent versus seven percent). Households using hand pounded rice significantly decreases with the increasing wealth quintile (23 percent among the lowest quintile and five percent in the highest quintile). By ethnicity, 38 percent of households from the Terai Brahmin/Chhetri used hand pounded rice. Households using small local milled rice ranged from 38 percent in the Far-western region to 55 percent in the Western region and from 41 percent in the Hill to 62 percent in the Terai. Higher proportion of households in rural areas compared to urban areas used small local milled rice (54 percent in rural and 35 percent in urban). Households using small local milled rice ranged from 35 percent in the lowest wealth quintile group to 64 percent in the middle wealth group.

Using rice from commercial, large scale mill was reported by six in ten households and ranged from 53 percent in the Eastern region to 64 percent in the Central and Far-western regions. Higher proportion of households in the Mountain and Hill compared to the Terai used large scale milled rice ( 77 percent in Mountain, 76 percent in Hill and 42 percent in Terai). Likewise, this proportion is higher in urban areas than rural areas ( 75 percent versus 57 percent). The proportion of households using large scale milled rice varied from 47 percent in the middle wealth quintile group to 79 percent in the lowest group. By ethnicity, over 80 percent of households in the Newar and Hill Dalit caste groups reported using commercial large scale milled rice (Table 18.13).

Among the households who consumed home pounded rice, a little over half, 54 percent, reported consuming it only seasonally while 46 percent consumed it all year round (Table 18.14). Among the households who consumed rice milled in small local mills, 73 percent consumed it year round while the remainder consumed it seasonally (Table 18.15). Among those who consumed rice from commercial/large-scale mills, it was consumed by almost threefourth of the households year round (Table 18.16).

The per-capita availability of rice was 250 grams per day among those who purchased small local milled rice, as well as for those who purchased commercial large milled rice (Table 18.17). Among the households consuming home produced rice, 58 percent had it available on the day of survey, among those who consumed small local milled rice, 87 percent had it available and among those who consumed large milled rice, 91 percent had available (Table 18.18). Among those reporting the availability of different types of rice, almost all could show the rice (98-100 percent). Among those observed the packaging, 11 percent of the small milled rice was in original packaging while more than half ( 53 percent) of the large milled rice was in original packaging (Table 18.19). Among those consuming rice produced by small local mills observed by enumerators ( $\mathrm{N}=24$ ), 15 were a Nepali brand, seven were an Indian brand and two did not have a brand name on the packaging (Data not shown). Among the large scale milled rice, the majority ( 83 percent) were a Nepali brand and 14 percent were an Indian brand (Table 18.20).

### 18.4 Households Purchasing and Consumption Patterns of Biscuits/Cookies


#### Abstract

Almost all households (96 percent) reported consuming biscuits/cookies, whether in or outside of the home. Notably, across all demographic or geographic characteristics, biscuit/cookie consumption was reported in over 90 percent of households (Table 18.21). The per-capita availability of biscuits was 0.9 pieces per day (Table 18.22).

Among the households who reported consuming biscuits/cookies, 11 percent reported having biscuits on the day of survey and among them 96 percent could show the biscuits they had. Almost all ( 96 percent) among the observed biscuits were in the original packaging (Table 18.23). Of those observed in the original packaging, 81 percent were a Nepali brand, 19 percent were an Indian brand and one percent were made in another country (Table 18.24). Among those observed in the original packaging, ten percent of the biscuits/cookies mentioned fortified with "iron" on the label (Table 18.25).


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Table 18.1: Noodles Consumption by Households and Availability on the Day of Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Noodles ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | N | People in household consume noodles in house or when eating outside of house |  |  | N | Reported have noodles the day of the survey ${ }^{\text {a }}$ |  |  | N | In original packaging ${ }^{\text {a,b,c }}$ |  |  |
|  |  | \% | (95\% CI) | p-value |  | \% | (95\% CI) | p-value |  | \% | (95\% CI) | p-value |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 864 \\ & 862 \\ & 859 \\ & 862 \\ & 862 \\ & \hline \end{aligned}$ | $\begin{aligned} & 95.2 \\ & 95.2 \\ & 94.3 \\ & 95.9 \\ & 95.3 \end{aligned}$ | $\begin{aligned} & (93.0-96.7) \\ & (93.7-96.3) \\ & (91.5-96.2) \\ & (94.5-96.9) \\ & (93.0-96.8) \\ & \hline \end{aligned}$ | 0.785 | $\begin{aligned} & 825 \\ & 823 \\ & 813 \\ & 827 \\ & 821 \end{aligned}$ | $\begin{aligned} & 7.0 \\ & 7.6 \\ & 9.2 \\ & 3.7 \\ & 4.3 \end{aligned}$ | $\begin{array}{r} (4.9-9.9) \\ (5.4-10.6) \\ (6.9-12.1) \\ (2.5-5.5) \\ (2.6-6.8) \end{array}$ | <0.001 | $\begin{array}{r} 59 \\ 62 \\ 111 \\ 31 \\ 36 \end{array}$ | $\begin{array}{r} 100.0 \\ 98.3 \\ 100.0 \\ (100.0) \\ (100.0) \end{array}$ | (84.2-99.8) | $0.429$ |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{array}{r} 719 \\ 1,794 \\ 1,796 \\ \hline \end{array}$ | $\begin{aligned} & 96.7 \\ & 95.4 \\ & 94.5 \end{aligned}$ | $\begin{aligned} & (93.8-98.3) \\ & (94.3-96.4) \\ & (93.1-95.7) \end{aligned}$ | 0.264 | $\begin{array}{r} 693 \\ 1,712 \\ 1,704 \\ \hline \end{array}$ | $\begin{aligned} & 6.9 \\ & 9.4 \\ & 4.6 \end{aligned}$ | $\begin{array}{r} (4.1-11.4) \\ (7.6-11.6) \\ (3.3-6.4) \\ \hline \end{array}$ | <0.001 | $\begin{array}{r} 92 \\ 128 \\ 79 \end{array}$ | $\begin{array}{r} 100.0 \\ 99.0 \\ 100.0 \\ \hline \end{array}$ | (91.2-99.9) | $0.512$ |
| Location <br> Urban <br> Rural | $\begin{array}{r} 598 \\ 3,711 \\ \hline \end{array}$ | $\begin{aligned} & 93.6 \\ & 95.3 \end{aligned}$ | $\begin{array}{r} (90.1-96.0) \\ (94.4-96.1) \\ \hline \end{array}$ | 0.084 | $\begin{array}{r} 562 \\ 3,547 \end{array}$ |  | $\begin{array}{r} (4.9-10.0) \\ (5.6-8.6) \\ \hline \end{array}$ | 0.713 | $\begin{array}{r}43 \\ 256 \\ \hline\end{array}$ | $\begin{array}{r} (95.4) \\ 100.0 \end{array}$ | (76.7-99.3) | 0.015 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{array}{r} 1,155 \\ 902 \\ 813 \\ 789 \\ 650 \\ \hline \end{array}$ | $\begin{aligned} & 94.1 \\ & 92.8 \\ & 95.8 \\ & 95.8 \\ & 97.1 \end{aligned}$ | $\begin{aligned} & (92.6-95.3) \\ & (90.1-94.9) \\ & (94.4-96.8) \\ & (93.8-97.1) \\ & (94.7-98.4) \\ & \hline \end{aligned}$ | 0.163 | $\begin{array}{r} 1,092 \\ 853 \\ 777 \\ 760 \\ 627 \\ \hline \end{array}$ | $\begin{array}{r} 2.2 \\ 4.9 \\ 7.1 \\ 6.7 \\ 13.7 \end{array}$ | $\begin{array}{r} (1.4-3.5) \\ (3.8-6.3) \\ (5.4-9.4) \\ (4.5-9.7) \\ (11.0-16.9) \\ \hline \end{array}$ | <0.001 | $\begin{aligned} & 34 \\ & 49 \\ & 66 \\ & 64 \\ & 86 \\ & \hline \end{aligned}$ | $\begin{array}{r} (100.0) \\ (100.0) \\ 100.0 \\ 100.0 \\ 98.4 \end{array}$ | (87.1-99.8) | $0.647$ |
| Ethnicity Hill Brahmin Hill Chhetri Terai Brahmin/Chhetri Other Terai caste Hill Dalit Terai Dalit Newar Hill Janajati Terai Janajati Muslim | $\begin{array}{r} 551 \\ 1,045 \\ 111 \\ 291 \\ 510 \\ 183 \\ 152 \\ 1,027 \\ 354 \\ 80 \\ \hline \end{array}$ | $\begin{aligned} & 93.5 \\ & 94.9 \\ & 95.0 \\ & 92.1 \\ & 97.8 \\ & 90.0 \\ & 95.8 \\ & 97.7 \\ & 95.8 \\ & 94.5 \\ & \hline \end{aligned}$ | $\begin{aligned} & (91.0-95.3) \\ & (93.0-96.2) \\ & (90.0-97.6) \\ & (87.6-95.0) \\ & (96.2-98.7) \\ & (83.8-94.0) \\ & (92.0-97.8) \\ & (96.9-98.4) \\ & (93.1-97.5) \\ & (84.8-98.2) \\ & \hline \end{aligned}$ | $0.001$ | $\begin{array}{r} 515 \\ 991 \\ 107 \\ 270 \\ 497 \\ 168 \\ 146 \\ 997 \\ 338 \\ 76 \end{array}$ | $\begin{array}{r} 9.8 \\ 10.3 \\ 2.3 \\ 3.0 \\ 3.4 \\ 1.0 \\ 13.3 \\ 7.7 \\ 3.6 \\ 2.0 \\ \hline \end{array}$ | $\begin{array}{r} (6.9-13.8) \\ (7.3-14.4) \\ (0.4-11.2) \\ (1.4-6.1) \\ (2.2-5.3) \\ (0.2-5.0) \\ (9.0-19.2) \\ (5.9-10.0) \\ (2.3-5.8) \\ (0.4-9.3) \\ \hline \end{array}$ | $<0.001$ | 47 73 3 7 22 2 23 109 11 2 | $\begin{array}{r} (100.0) \\ 100.0 \\ * \\ * \\ * \\ * \\ * \\ 100.0 \\ * \end{array}$ | $*$ $*$ $*$ $*$ - $*$ |  |
| Total | 4,309 | 95.1 | (94.2-95.8) |  | 4,109 | 7.0 | (5.8-8.3) |  | 299 | 99.4 | (94.9-99.9) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P -value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ Among those who reported household consumes noodles
${ }^{\mathrm{b}}$ Among those who reported they had noodles the day of the survey
${ }^{\text {c }}$ Among those with observed noodles in the original packaging

Table 18.2: Fortification Statements on Packaging of Noodles, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Noodles ${ }^{\text {a,b,c }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Label says fortified with |  |  |  |  |  |
|  |  | Iron |  | Folic acid |  | Vitamin A |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 59 | 30.5 | (19.9-43.6) | 0.0 | - | 83.1 | (69.9-91.2) |
| Central | 61 | 24.6 | (14.8-38.0) | 4.9 | (2.4-9.7) | 23.0 | (12.8-37.7) |
| Western | 111 | 11.7 | (6.4-20.5) | 2.7 | (0.6-11.6) | 11.7 | (6.4-20.5) |
| Mid-western | 31 | (19.4) | (8.6-37.9) | (3.2) | (0.4-20.6) | (77.4) | (66.7-85.4) |
| Far-western | 36 | (75.0) | (53.4-88.7) | (16.7) | (6.8-35.4) | (80.6) | (65.9-89.9) |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 92 | 9.8 | (6.2-15.2) | 1.1 | (0.1-7.6) | 17.4 | (10.3-27.8) |
| Hill | 127 | 31.5 | (22.5-42.1) | 6.3 | (2.9-13.3) | 46.5 | (37.0-56.1) |
| Terai | 79 | 38.0 | (25.8-51.9) | 5.1 | (1.9-12.8) | 68.4 | (55.5-78.9) |
| Location |  |  |  |  |  |  |  |
| Urban | 42 | (42.9) | (23.5-64.6) | (4.8) | (0.8-24.7) | (40.5) | (19.8-65.1) |
| Rural | 256 | 23.8 | (18.0-30.9) | 4.3 | (2.3-7.8) | 43.8 | (35.8-52.0) |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 24 | (33.3) | (11.6-65.5) | (4.2) | (0.6-24.1) | (62.5) | (33.9-84.4) |
| Second | 36 | (25.0) | (14.9-38.7) | (2.8) | (2.1-3.7) | (36.1) | (22.2-52.9) |
| Middle | 66 | 27.3 | (17.5-39.8) | 6.1 | (2.2-15.6) | 47.0 | (31.7-62.8) |
| Fourth | 69 | 23.2 | (13.9-36.1) | 1.4 | (0.2-9.5) | 44.9 | (32.3-58.2) |
| Highest | 103 | 27.2 | (17.9-39.0) | 5.8 | (2.9-11.3) | 37.9 | (27.6-49.4) |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 47 | (38.3) | (24.4-54.4) | (6.4) | (2.7-14.2) | (44.7) | (32.0-58.1) |
| Hill Chhetri | 73 | 39.7 | (28.1-52.7) | 6.8 | (2.5-17.6) | 60.3 | (47.9-71.5) |
| Terai Brahmin/Chhetri | 3 | * | * | * | * | * | * |
| Other Terai caste | 7 | * | * | * | * | * | * |
| Hill Dalit | 22 | * | * | * | * | * | * |
| Terai Dalit | 2 | * | * | * | * | * | * |
| Newar | 22 | * | * | * | * | * | * |
| Hill Janajati | 109 | 17.4 | (11.5-25.6) | 1.8 | (0.7-5.0) | 29.4 | (20.3-40.4) |
| Terai Janajati | 11 | * | * | * | * | * | * |
| Muslim | 2 | * | * | * | * | * | * |
| Total | 298 | 26.5 | (20.8-33.2) | 4.4 | (2.4-7.8) | 43.3 | (36.4-50.5) |
| Note: Both Ns and estimates are unweighted. |  |  |  |  |  |  |  |
| Prevalence estimates in parentheses ba based on fewer than 25 unweighted cas Sample size might vary slightly due to Significant test did not perform due to ${ }^{\text {a }}$ Among those who reported household ${ }^{\mathrm{b}}$ Among those who reported they had n ${ }^{\text {c }}$ Among those with observed noodles | on a sa and has sing da ll samp mbers les the origin | size of 2 suppres <br> e. <br> me nood <br> of the sur <br> ckaging | 9 and should | preted w | caution. An a | k indicat | that a figure is |

Table 18.3: Estimated Per Capita Daily Availability of Noodle in the Households, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Asked for Noodle used in households.
${ }^{\text {b }}$ Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household members.

Table 18.4: Reported Households Used Cooking Oil to Cook or Prepare Food, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Cooking oil used in household |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Reported households uses cooking oil to prepare food |  |  |
|  |  | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |
| Eastern | 864 | 99.8 | (99.6-99.9) |  |
| Central | 862 | 100.0 | (0.0-100.0) |  |
| Western | 859 | 99.4 | (99.4-99.5) | 0.028 |
| Mid-western | 862 | 99.9 | (99.0-100.0) |  |
| Far-western | 862 | 99.9 | (99.0-100.0) |  |
| Ecological Region |  |  |  |  |
| Mountain | 719 | 99.5 | (98.5-99.8) |  |
| Hill | 1,794 | 99.7 | (99.6-99.8) | 0.041 |
| Terai | 1,796 | 100.0 | (0.0-100.0) |  |
| Location |  |  |  |  |
| Urban | 598 | 100.0 | (0.0-100.0) | 0.255 |
| Rural | 3,711 | 99.8 | (99.7-99.8) | 0.255 |
| Wealth Quintile |  |  |  |  |
| Lowest | 1,155 | 99.5 | (99.2-99.7) |  |
| Second | 902 | 99.8 | (99.6-99.9) | 0.135 |
| Middle | 813 | 99.8 | (99.8-99.8) | 0.135 |
| Fourth | 789 | 100.0 | (0.0-100.0) |  |
| Highest | 650 | 100.0 | (0.0-100.0) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 551 | 99.3 | (99.2-99.4) |  |
| Hill Chhetri | 1,045 | 99.7 | (99.4-99.8) |  |
| Terai Brahmin/Chhetri | 111 | 99.6 | (97.2-100.0) |  |
| Other Terai caste | 291 | 100.0 | (0.0-100.0) |  |
| Hill Dalit | 510 | 100.0 | (0.0-100.0) | 0.082 |
| Terai Dalit | 183 | 100.0 | (0.0-100.0) | 0.082 |
| Newar | 152 | 100.0 | (0.0-100.0) |  |
| Hill Janajati | 1,027 | 100.0 | (99.7-100.0) |  |
| Terai Janajati | 354 | 100.0 | (0.0-100.0) |  |
| Muslim | 80 | 100.0 | (0.0-100.0) |  |
| Total | 4,309 | 99.8 | (99.8-99.9) |  |

[^57]Table 18.5: Main Type of Cooking Oil Used by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Main type of cooking oil used in household ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Mustard oil |  |  | Sunflower oil |  |  | Soybean oil |  |  | Other oil |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 861 | 64.3 | (57.2-70.9) |  | 30.7 | (24.6-37.5) |  | 5.0 | (3.2-7.8) |  | 0.0 | - |  |
| Central | 862 | 56.0 | (49.4-62.5) |  | 28.6 | (23.0-34.8) |  | 14.2 | (10.9-18.2) |  | 1.3 | (0.4-3.7) |  |
| Western | 856 | 65.3 | (57.4-72.4) | $<0.001$ | 26.7 | (20.6-33.9) | $<0.001$ | 7.9 | (6.3-9.8) | $<0.001$ | 0.1 | (0.0-0.7) | $<0.001$ |
| Mid-western | 861 | 79.7 | (75.2-83.6) |  | 8.3 | (5.6-12.2) |  | 9.4 | (7.2-12.2) |  | 2.2 | (1.0-4.7) |  |
| Far-western | 861 | 88.4 | (83.9-91.8) |  | 6.7 | (4.4-9.9) |  | 3.9 | (2.3-6.5) |  | 1.1 | (0.5-2.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 716 | 57.0 | (46.9-66.6) |  | 16.4 | (11.9-22.3) |  | 26.2 | (15.4-40.8) |  | 0.3 | (0.3-0.4) |  |
| Hill | 1,789 | 60.0 | (55.6-64.3) | $<0.001$ | 27.5 | (24.1-31.2) | <0.001 | 12.4 | (10.3-14.8) | <0.001 | 0.1 | (0.0-0.4) | <0.001 |
| Terai | 1,796 | 72.4 | (66.9-77.4) |  | 22.1 | (17.5-27.6) |  | 3.7 | (2.7-5.1) |  | 1.6 | (0.8-3.2) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 47.4 | (36.3-58.8) | <0.001 | 39.2 | (32.8-46.1) | <0.001 | 12.6 | (6.5-23.1) | 0.002 | 0.6 | (0.2-1.9) | 0.583 |
| Rural | 3,703 | 68.7 | (64.4-72.6) | <0.001 | 21.8 | (18.3-25.6) | <0.001 | 8.7 | (7.1-10.6) | 0.002 | 0.9 | (0.4-1.8) | 0.583 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,150 | 79.2 | (75.4-82.5) |  | 10.1 | (7.7-13.0) |  | 9.9 | (7.8-12.6) |  | 0.7 | (0.3-1.7) |  |
| Second | 900 | 73.1 | (68.7-77.1) |  | 16.3 | (13.5-19.4) |  | 9.5 | (7.0-12.7) |  | 1.1 | (0.5-2.6) |  |
| Middle | 812 | 71.2 | (65.8-76.1) | $<0.001$ | 21.5 | (17.0-26.8) | <0.001 | 6.0 | (4.4-8.2) | 0.010 | 1.3 | (0.7-2.4) | 0.026 |
| Fourth | 789 | 59.8 | (54.8-64.7) |  | 28.5 | (24.0-33.5) |  | 10.5 | (8.4-13.0) |  | 1.1 | (0.5-2.3) |  |
| Highest | 650 | 45.3 | (39.1-51.6) |  | 44.6 | (38.8-50.5) |  | 10.2 | (7.4-13.7) |  | 0.0 | - |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 548 | 61.4 | (55.1-67.3) |  | 33.2 | (27.9-38.9) |  | 5.2 | (3.5-7.7) |  | 0.2 | (0.1-0.2) |  |
| Hill Chhetri | 1,042 | 63.1 | (58.3-67.6) |  | 26.3 | (22.7-30.3) |  | 10.1 | (7.1-14.0) |  | 0.6 | (0.3-1.2) |  |
| Terai Brahmin/Chhetri | 110 | 63.8 | (56.1-70.8) |  | 30.7 | (22.6-40.1) |  | 4.3 | (1.6-11.2) |  | 0.8 | (0.2-3.6) |  |
| Other Terai caste | 291 | 83.9 | (76.5-89.3) |  | 9.9 | (5.9-16.1) |  | 1.7 | (0.7-4.1) |  | 4.5 | (1.7-11.5) |  |
| Hill Dalit | 510 | 73.5 | (67.8-78.5) | <0.001 | 19.9 | (15.0-25.9) | <0.001 | 6.0 | (4.4-8.0) | <0.001 | 0.7 | (0.2-2.1) | <0.001 |
| Terai Dalit | 183 | 88.4 | (80.8-93.3) | <0.001 | 8.7 | (4.6-15.7) | <0.001 | 1.3 | (0.4-4.3) | <0.001 | 1.6 | (0.3-7.4) | <0.001 |
| Newar | 152 | 29.4 | (17.4-45.1) |  | 43.8 | (32.8-55.4) |  | 26.8 | (17.8-38.3) |  | 0.0 | - |  |
| Hill Janajati | 1,026 | 56.5 | (51.4-61.4) |  | 28.2 | (24.0-32.8) |  | 15.3 | (12.6-18.5) |  | 0.0 | (0.0-0.0) |  |
| Terai Janajati | 354 | 79.4 | (72.1-85.1) |  | 14.8 | (9.2-22.9) |  | 5.0 | (2.3-10.6) |  | 0.4 | (0.1-1.5) |  |
| Muslim | 80 | 81.1 | (71.3-88.1) |  | 10.7 | (5.3-20.4) |  | 6.5 | (2.4-16.7) |  | 1.7 | (0.2-12.2) |  |
|  | 4,301 | 65.7 | (62.3-69.0) |  | 24.2 | (21.4-27.3) |  | 9.2 | (7.8-10.8) |  | 0.8 | (0.4-1.6) |  |
| Note: N unweighted. All estimat Sample size might vary slightly P-value obtained from Pearson's ${ }^{a}$ Among those who use cooking | eighting <br> ta. | mplex | le design. |  |  |  |  |  |  |  |  |  |  |

Table 18.6: Estimated Per Capita Daily Availability of Cooking Oil in the Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Per capita availability of cooking oil in the housheold ${ }^{\text {a }, ~ b}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Soybean oil |  | Sunflower oil |  | Mustard oil |  | Any Oil |  |
|  | N | Median g/day | N | Median g/day | N | Median g/day | N | Median g/day |
| Development Region |  |  |  |  |  |  |  |  |
| Eastern | 529 | 22.2 | 275 | 23.8 | 57 | 20.8 | 794 | 22.2 |
| Central | 460 | 20.4 | 252 | 26.7 | 140 | 25.0 | 805 | 22.2 |
| Western | 502 | 25.0 | 234 | 25.0 | 117 | 27.8 | 793 | 25.0 |
| Mid-western | 663 | 21.7 | 77 | 26.7 | 100 | 22.2 | 724 | 22.2 |
| Far-western | 759 | 20.0 | 59 | 25.0 | 34 | (25.0) | 716 | 20.0 |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 384 | 17.9 | 123 | 22.2 | 205 | 20.0 | 689 | 19.1 |
| Hill | 1,214 | 22.2 | 408 | 26.7 | 163 | 25.0 | 1,651 | 25.0 |
| Terai | 1,315 | 20.8 | 366 | 25.0 | 80 | 26.7 | 1,492 | 22.2 |
| Location |  |  |  |  |  |  |  |  |
| Urban | 288 | 25.0 | 244 | 27.8 | 61 | 27.8 | 549 | 25.0 |
| Rural | 2,625 | 20.8 | 653 | 25.0 | 387 | 22.2 | 3,283 | 22.2 |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 924 | 19.1 | 92 | 17.9 | 124 | 20.0 | 1,057 | 19.1 |
| Second | 649 | 20.8 | 140 | 22.2 | 101 | 22.2 | 805 | 20.8 |
| Middle | 572 | 22.2 | 157 | 22.2 | 72 | 23.8 | 696 | 22.2 |
| Fourth | 467 | 22.2 | 215 | 26.7 | 95 | 25.0 | 687 | 23.8 |
| Highest | 301 | 25.0 | 293 | 27.8 | 56 | 27.8 | 587 | 27.8 |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 348 | 27.8 | 166 | 26.7 | 32 | (25.0) | 460 | 26.7 |
| Hill Chhetri | 740 | 25.0 | 180 | 27.8 | 113 | 25.0 | 913 | 25.0 |
| Terai Brahmin/ Chhetri | 72 | 22.2 | 29 | (20.0) | 6 | * | 98 | 22.2 |
| Other Terai caste | 246 | 20.0 | 27 | (25.0) | 6 | * | 247 | 20.0 |
| Hill Dalit | 393 | 20.8 | 75 | 25.0 | 39 | (22.2) | 494 | 22.2 |
| Terai Dalit | 159 | 16.7 | 14 | * | 4 | * | 165 | 16.7 |
| Newar | 42 | (27.8) | 73 | 27.8 | 37 | (23.8) | 149 | 26.7 |
| Hill Janajati | 551 | 22.2 | 283 | 25.0 | 190 | 22.2 | 966 | 22.2 |
| Terai Janajati | 293 | 20.8 | 42 | (22.2) | 15 | * | 263 | 22.2 |
| Muslim | 65 | 16.7 | 8 | * | 5 | * | 72 | 18.2 |
| Total | 2,913 | 22.2 | 897 | 25.0 | 448 | 23.8 | 3,832 | 22.2 |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. <br> An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> ${ }^{\text {a }}$ Asked for cooking oil used in households. <br> ${ }^{\text {b }}$ Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household members. |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Table 18.7: Mustard Oil as Main Cooking Oil Type and Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Mustard oil is main type of cooking oil used in household ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have mustard oil the day of the survey |  |  |  | Observed ${ }^{\text {b }}$ |  |  |  | Oil is potentially fortifiable ${ }^{\mathbf{c}}$ |  |  |  | In original packaging ${ }^{\text {b }}$ |  |  |  |
|  | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 529 | 97.6 | (95.7-98.6) |  | 516 | 99.6 | (98.8-99.9) |  | 529 | 87.0 | (72.1-94.5) |  | 376 | 41.7 | (35.9-47.7) |  |
| Central | 460 | 98.8 | (98.1-99.2) |  | 453 | 100.0 | (0.0-100.0) |  | 460 | 86.9 | (81.9-90.7) |  | 328 | 49.0 | (44.6-53.4) |  |
| Western | 502 | 97.1 | (93.5-98.7) | 0.048 | 487 | 100.0 | (0.0-100.0) | 0.044 | 502 | 88.4 | (83.7-91.9) | $<0.001$ | 422 | 47.6 | (43.9-51.3) | $<0.001$ |
| Mid-western | 663 | 99.1 | (97.9-99.6) |  | 657 | 100.0 | (0.0-100.0) |  | 663 | 78.3 | (71.6-83.8) |  | 482 | 43.9 | (39.0-48.9) |  |
| Far-western | 759 | 97.3 | (96.0-98.3) |  | 739 | 100.0 | (0.0-100.0) |  | 759 | 79.5 | (74.8-83.5) |  | 592 | 32.0 | (27.8-36.5) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 384 | 97.6 | (95.4-98.7) |  | 374 | 100.0 | (0.0-100.0) |  | 384 | 91.9 | (85.8-95.5) |  | 354 | 31.4 | (25.7-37.9) |  |
| Hill | 1,214 | 98.3 | (96.8-99.1) | 0.725 | 1,191 | 99.8 | (99.3-99.9) | 0.121 | 1,214 | 89.6 | (86.4-92.2) | <0.001 | 1,040 | 35.6 | (33.1-38.1) | <0.001 |
| Terai | 1,315 | 97.9 | (97.0-98.5) |  | 1,287 | 100.0 | (0.0-100.0) |  | 1,315 | 80.6 | (74.6-85.4) |  | 806 | 55.7 | (51.9-59.4) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 288 | 99.2 | (97.5-99.7) | 0.110 | 284 | 99.7 | (97.7-100.0) | 0.184 | 288 | 87.6 | (77.6-93.5) | 0.188 | 205 | 38.2 | (23.8-55.0) | 0.058 |
| Rural | 2,625 | 97.9 | (97.1-98.5) | 0.110 | 2,568 | 99.9 | (99.5-100.0) |  | 2,625 | 84.7 | (81.0-87.8) | 0.188 | 1,995 | 45.0 | (42.2-47.8) | 0.058 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 924 | 98.0 | (96.9-98.7) |  | 904 | 100.0 | (0.0-100.0) |  | 924 | 90.8 | (87.0-93.5) |  | 810 | 32.1 | (27.9-36.5) |  |
| Second | 649 | 98.0 | (95.9-99.0) |  | 636 | 99.8 | (98.9-100.0) |  | 649 | 87.4 | (83.0-90.8) |  | 490 | 47.9 | (42.8-53.0) |  |
| Middle | 572 | 97.1 | (94.8-98.4) | 0.219 | 556 | 99.9 | (99.0-100.0) | 0.760 | 572 | 82.4 | (75.0-87.9) | $<0.001$ | 380 | 54.7 | (49.1-60.2) | <0.001 |
| Fourth | 467 | 98.8 | (97.0-99.5) |  | 461 | 99.8 | (98.9-100.0) |  | 467 | 81.0 | (73.0-87.0) |  | 327 | 48.9 | (42.4-55.4) |  |
| Highest | 301 | 98.8 | (96.8-99.5) |  | 295 | 100.0 | (0.0-100.0) |  | 301 | 80.6 | (75.4-84.8) |  | 193 | 43.1 | (34.7-51.9) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 348 | 98.0 | (94.5-99.3) |  | 341 | 100.0 | (0.0-100.0) |  | 348 | 75.1 | (65.2-82.9) |  | 235 | 45.9 | (39.3-52.7) |  |
| Hill Chhetri | 740 | 97.4 | (95.5-98.6) |  | 719 | 100.0 | (0.0-100.0) |  | 740 | 82.6 | (77.3-86.8) |  | 585 | 39.5 | (34.0-45.2) |  |
| Terai Brahmin/Chhetri | 72 | 99.1 | (93.0-99.9) |  | 71 | 100.0 | (0.0-100.0) |  | 72 | 84.8 | (72.9-92.0) |  | 46 | (44.1) | (27.1-62.7) |  |
| Other Terai caste | 246 | 99.5 | (96.6-99.9) |  | 245 | 100.0 | (0.0-100.0) |  | 246 | 84.9 | (75.3-91.2) |  | 169 | 66.7 | (58.7-73.8) |  |
| Hill Dalit | 393 | 98.3 | (95.0-99.4) | 77 | 387 | 100.0 | (0.0-100.0) | 0.787 | 393 | 96.0 | (92.5-97.9) | <0.001 | 367 | 33.3 | (27.6-39.5) | <0.001 |
| Terai Dalit | 159 | 95.9 | (92.1-97.9) |  | 154 | 99.6 | (97.3-100.0) |  | 159 | 87.6 | (72.2-95.1) | <0.001 | 93 | 55.1 | (37.7-71.4) | <0.001 |
| Newar | 42 | (98.8) | (91.9-99.8) |  | 41 | (100.0) | (0.0-100.0) |  | 42 | (89.7) | (75.5-96.1) |  | 24 | * | * |  |
| Hill Janajati | 551 | 98.6 | (97.6-99.2) |  | 541 | 99.8 | (98.8-100.0) |  | 551 | 89.9 | (85.4-93.1) |  | 478 | 37.4 | (33.6-41.5) |  |
| Terai Janajati | 293 | 97.7 | (94.3-99.1) |  | 287 | 99.7 | (97.9-100.0) |  | 293 | 76.5 | (66.3-84.3) |  | 153 | 50.3 | (37.7-62.9) |  |
| Muslim | 65 | 95.1 | (84.3-98.6) |  | 62 | 100.0 | (0.0-100.0) |  | 65 | 90.5 | (78.8-96.1) |  | 46 | (49.5) | (34.2-64.8) |  |
| Total | 2,913 | 98.0 | (97.3-98.6) |  | 2,852 | 99.9 | (99.7-100.0) |  | 2,913 | 85.0 | (81.6-87.9) |  | 2,200 | 44.3 | (42.1-46.4) |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who reported household uses cooking oil and mustard oil is main type used |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Among those who reported they had cooking oil the day of the survey |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 18.8: Type of Brand of Mustard Oil Used in Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mustard oil is main type of cooking oil used in household ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Brand |  |  |  |  |  |
|  |  | No brand ${ }^{\text {b,c }}$ |  | Nepal ${ }^{\text {b,c }}$ |  | India ${ }^{\text {b,c }}$ |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 137 | 0.7 | (0.1-5.4) | 60.6 | (45.3-74.0) | 38.7 | (25.7-53.5) |
| Central | 164 | 0.0 | - | 48.8 | (34.2-63.5) | 51.2 | (36.5-65.8) |
| Western | 217 | 0.0 | - | 71.4 | (60.8-80.1) | 28.6 | (19.9-39.2) |
| Mid-western | 210 | 0.5 | (0.1-3.4) | 66.7 | (56.4-75.6) | 32.9 | (24.0-43.1) |
| Far-western | 185 | 0.5 | (0.1-3.7) | 49.2 | (36.3-62.1) | 50.3 | (37.6-62.9) |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 128 | 0.0 | - | 91.4 | (69.6-98.0) | 8.6 | (2.0-30.4) |
| Hill | 342 | 0.3 | (0.0-2.1) | 88.9 | (84.5-92.2) | 10.8 | (7.6-15.2) |
| Terai | 443 | 0.5 | (0.1-1.8) | 28.9 | (20.9-38.5) | 70.7 | (61.3-78.5) |
| Location |  |  |  |  |  |  |  |
| Urban | 82 | 0.0 | - | 47.6 | (24.3-71.9) | 52.4 | (28.1-75.7) |
| Rural | 831 | 0.4 | (0.1-1.1) | 61.4 | (55.2-67.2) | 38.3 | (32.5-44.4) |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 174 | 0.6 | (0.1-4.1) | 78.7 | (70.5-85.1) | 20.7 | (14.4-28.8) |
| Second | 197 | 0.0 | - | 66.5 | (57.9-74.1) | 33.5 | (25.9-42.1) |
| Middle | 213 | 0.0 | - | 57.3 | (48.4-65.7) | 42.7 | (34.3-51.6) |
| Fourth | 198 | 0.5 | (0.1-3.7) | 45.5 | (35.4-55.9) | 54.0 | (43.7-64.0) |
| Highest | 131 | 0.8 | (0.1-5.3) | 52.7 | (41.9-63.2) | 46.6 | (36.2-57.2) |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 102 | 0.0 | - | 78.4 | (67.3-86.5) | 21.6 | (13.5-32.7) |
| Hill Chhetri | 211 | 0.0 | - | 71.1 | (61.7-79.0) | 28.9 | (21.0-38.3) |
| Terai Brahmin/Chhetri | 20 | * | * | * | * | * | * |
| Other Terai Caste | 117 | 0.0 | - | 10.3 | (4.3-22.6) | 89.7 | (77.4-95.7) |
| Hill Dalit | 118 | 0.8 | (0.1-5.8) | 78.8 | (61.5-89.7) | 20.3 | (9.6-38.0) |
| Terai Dalit | 50 | 0.0 | - | 18.0 | (6.7-40.0) | 82.0 | (60.0-93.3) |
| Newar | 8 | * | * | * |  | * |  |
| Hill Janajati | 182 | 0.0 | - | 89.0 | (82.6-93.2) | 11.0 | (6.8-17.4) |
| Terai Janajati | 78 | 0.0 | - | 41.0 | (22.9-62.0) | 56.4 | (36.3-74.6) |
| Muslim | 25 | (0.0) | - | (4.0) | (0.6-21.4) | (96.0) | (78.6-99.4) |
| Total | 913 | 0.3 | (0.1-1.0) | 60.1 | (54.4-65.6) | 39.5 | (34.2-45.2) |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Significant test did not perform due to small sample size.
${ }^{\text {a }}$ Among those who reported household uses cooking oil and mustard oil is main type used
${ }^{\text {b }}$ Among those who reported they had cooking oil the day of the survey
${ }^{\mathrm{c}}$ Among those with observed cooking oil in the original packaging
Table 18.9: Sunflower Oil as Main Cooking Oil Type and Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Sunflower Oil is main type of cooking oil used in household ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have Sunflower Oil the day of the survey |  |  |  | Observed ${ }^{\text {b }}$ |  |  |  | Oil is potentially fortifiable ${ }^{\text {c }}$ |  |  |  | In original packaging ${ }^{\text {b }}$ |  |  |  |
|  | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 275 | 96.3 | (90.8-98.5) |  | 266 | 99.1 | (96.5-99.8) |  | 275 | 100.0 | - |  | 274 | 38.2 | (31.7-45.2) |  |
| Central | 252 | 97.0 | (95.2-98.2) |  | 246 | 100.0 | (0.0-100.0) |  | 252 | 99.5 | (97.0-99.9) |  | 249 | 47.1 | (39.0-55.3) |  |
| Western | 234 | 98.8 | (97.9-99.3) | 0.513 | 232 | 98.9 | (97.7-99.5) | 0.333 | 234 | 100.0 |  | <0.001 | 231 | 51.1 | (45.7-56.5) | 0.031 |
| Mid-western | 77 | 94.7 | (81.5-98.7) |  | 73 | 100.0 | - |  | 77 | 95.6 | (75.7-99.4) |  | 66 | 49.4 | (37.8-61.2) |  |
| Far-western | 59 | 94.1 | (88.2-97.2) |  | 56 | 100.0 | - |  | 59 | 100.0 |  |  | 55 | 39.0 | (25.8-54.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 123 | 99.0 | (93.1-99.9) |  | 122 | 100.0 | - |  | 123 | 100.0 | (0.0-100.0) |  | 121 | 31.6 | (26.0-37.7) |  |
| Hill | 408 | 97.0 | (95.0-98.2) | 0.435 | 396 | 99.5 | (99.1-99.8) | 0.711 | 408 | 99.6 | (97.5-99.9) | 0.892 | 404 | 44.6 | (37.8-51.6) | 0.099 |
| Terai | 366 | 96.8 | (93.6-98.4) |  | 355 | 99.4 | (97.4-99.9) |  | 366 | 99.5 | (96.8-99.9) |  | 350 | 47.3 | (42.6-52.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 244 | 96.9 | (92.0-98.9) | 0.998 | 235 | 100.0 | (0.0-100.0) | 0.226 | 244 | 100.0 | - | 0.279 | 234 | 36.7 | (29.5-44.6) | 0.003 |
| Rural | 653 | 97.0 | (94.9-98.3) | 0.998 | 638 | 99.3 | (98.5-99.7) |  | 653 | 99.5 | (98.1-99.9) | 0.279 | 641 | 47.6 | (43.5-51.6) | 0.003 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 92 | 98.5 | (93.1-99.7) |  | 90 | 97.2 | (95.1-98.4) |  | 92 | 100.0 | - |  | 91 | 34.1 | (22.8-47.6) |  |
| Second | 140 | 94.6 | (89.3-97.4) |  | 134 | 100.0 | - |  | 140 | 100.0 | - |  | 133 | 41.4 | (35.4-47.7) |  |
| Middle | 157 | 96.9 | (92.2-98.8) | 0.674 | 154 | 100.0 | - | 0.581 | 157 | 99.6 | (97.4-99.9) | 0.030 | 153 | 41.3 | (35.2-47.6) | 0.006 |
| Fourth | 215 | 98.3 | (94.9-99.5) |  | 211 | 99.2 | (95.0-99.9) |  | 215 | 99.4 | (96.1-99.9) |  | 211 | 49.5 | (43.0-56.0) |  |
| Highest | 293 | 96.7 | (94.3-98.1) |  | 284 | 99.8 | (98.2-100.0) |  | 293 | 99.5 | (96.7-99.9) |  | 287 | 48.0 | (38.7-57.5) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 166 | 98.5 | (97.7-99.0) |  | 164 | 100.0 | (0.0-100.0) |  | 166 | 100.0 | - |  | 164 | 56.5 | (45.7-66.7) |  |
| Hill Chhetri | 180 | 96.2 | (90.6-98.5) |  | 174 | 99.1 | (93.9-99.9) |  | 180 | 98.2 | (93.1-99.5) |  | 174 | 43.9 | (34.4-53.9) |  |
| Terai Brahmin/Chhetri | 29 | (96.4) | (85.0-99.2) |  | 27 | (100.0) | - |  | 29 | (100.0) | - |  | 27 | (36.9) | (18.6-60.0) |  |
| Other Terai caste | 27 | (95.7) | (74.5-99.4) |  | 26 | (100.0) | - |  | 27 | (100.0) | - |  | 26 | (40.4) | (25.3-57.7) |  |
| Hill Dalit | 75 | 98.2 | (92.7-99.6) |  | 73 | 100.0 | - |  | 75 | 100.0 | - |  | 74 | 26.7 | (19.0-36.0) |  |
| Terai Dalit | 14 | * | * | 0.442 | 13 | * | * | 0.633 | 14 | * | * | 0.059 | 12 | * |  | 0.018 |
| Newar | 73 | 97.7 | (90.4-99.5) |  | 71 | 100.0 | - |  | 73 | 100.0 | - |  | 72 | 36.8 | (25.8-49.5) |  |
| Hill Janajati | 283 | 97.2 | (94.6-98.6) |  | 277 | 99.2 | (98.4-99.6) |  | 283 | 100.0 | - |  | 281 | 48.5 | (43.7-53.2) |  |
| Terai Janajati | 42 | (92.2) | (71.6-98.2) |  | 40 | (98.1) | (87.5-99.7) |  | 42 | (100.0) | - |  | 40 | (35.3) | (23.3-49.5) |  |
| Muslim | , |  | * |  | 8 | * | * |  | 8 | * | * |  | 5 | * | * |  |
| Total | 897 | 97.0 | (95.4-98.0) |  | 873 | 99.5 | (98.8-99.8) |  | 897 | 99.6 | (98.5-99.9) |  | 875 | 45.1 | (41.0-49.3) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample size might vary slightly due to missing dataP-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {a }}$ Among those who reported household uses cooking oil and sunflower oil is main type used |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Among those who reported they had cooking oil the day of the survey |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {E Excluded cooking oil produced }}$ |  | memade) | d those who do | t know w | they | the cook |  |  |  |  |  |  |  |  |  |  |

Table 18.10: Type of Brand of Sunflower Oil Used in Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Sunflower Oil is main type of cooking oil used in household ${ }^{\text {a,b,c }}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Brand |  |  |  |
|  |  | Nepal |  | India |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |
| Eastern | 91 | 91.2 | (80.7-96.3) | 7.7 | (3.2-17.3) |
| Central | 115 | 95.7 | (89.1-98.3) | 2.6 | (0.6-10.1) |
| Western | 120 | 88.3 | (80.9-93.1) | 9.2 | (5.6-14.7) |
| Mid-western | 32 | (78.1) | (49.5-92.9) | (18.8) | (5.0-50.2) |
| Far-western | 21 | * | * | * | * |
| Ecological Region |  |  |  |  |  |
| Mountain | 49 | (95.9) | (90.1-98.4) | (2.0) | (0.3-12.5) |
| Hill | 164 | 94.5 | (89.5-97.2) | 3.7 | (1.6-8.2) |
| Terai | 166 | 81.3 | (72.7-87.7) | 16.9 | (11.0-25.0) |
| Location |  |  |  |  |  |
| Urban | 92 | 85.9 | (75.0-92.5) | 8.7 | (4.1-17.4) |
| Rural | 287 | 89.9 | (84.9-93.4) | 9.4 | (6.0-14.4) |
| Wealth Quintile |  |  |  |  |  |
| Lowest | 10 | * | * | * | * |
| Second | 43 | (100.0) | - | (0.0) | - |
| Middle | 65 | 84.6 | (73.1-91.8) | 15.4 | (8.2-26.9) |
| Fourth | 93 | 86.0 | (76.8-92.0) | 11.8 | (6.3-21.1) |
| Highest | 168 | 88.7 | (82.2-93.0) | 8.3 | (5.1-13.4) |
| Ethnicity |  |  |  |  |  |
| Hill Brahmin | 88 | 84.1 | (76.7-89.5) | 11.4 | (6.5-19.1) |
| Hill Chhetri | 72 | 87.5 | (77.2-93.5) | 12.5 | (6.5-22.8) |
| Terai Brahmin/Chhetri | 11 | * | * | * | * |
| Other Terai caste | 11 | * | * | * | * |
| Hill Dalit | 18 | * | * | * | * |
| Terai Dalit | 5 | * | * | * | * |
| Newar | 27 | (81.5) | (61.3-92.4) | (11.1) | (3.9-27.7) |
| Hill Janajati | 127 | 97.6 | (93.0-99.2) | 1.6 | (0.4-6.1) |
| Terai Janajati | 17 | * | * | * | * |
| Muslim | 3 | * | * | * | * |
| Total | 379 | 88.9 | (84.6-92.1) | 9.2 | (6.4-13.2) |

[^58]Table 18.11: Soybean Oil as Main Cooking Oil Type and Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Soybean Oil is main type of cooking oil used in household ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have Soybean Oil the day of the survey |  |  | Observed ${ }^{\text {b }}$ |  |  | Oil is potentially fortifiable ${ }^{\text {c }}$ |  |  |  | In original packaging ${ }^{\text {b }}$ |  |  |
|  | N | \% | (95\% CI) | N | \% | (95\% CI) | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 57 | 100.0 | - | 57 | 100.0 | - | 57 | 100.0 | - |  | 56 | 67.9 | (58.8-75.7) |
| Central | 140 | 97.9 | (89.9-99.6) | 137 | 100.0 | - | 140 | 100.0 | - |  | 138 | 50.7 | (43.7-57.8) |
| Western | 117 | 98.3 | (93.4-99.6) | 115 | 100.0 | - | 117 | 99.1 | (93.8-99.9) | 0.586 | 115 | 67.8 | (54.0-79.1) |
| Mid-western | 100 | 100.0 |  | 100 | 100.0 | - | 100 | 100.0 | - |  | 97 | 33.0 | (24.1-43.3) |
| Far-western | 34 | (97.1) | (82.1-99.6) | 33 | (100.0) | - | 34 | (100.0) | - |  | 32 | (31.3) | (15.6-52.8) |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 205 | 99.5 | (96.5-99.9) | 204 | 100.0 | - | 205 | 100.0 | - |  | 200 | 56.5 | (46.7-65.8) |
| Hill | 163 | 98.2 | (91.6-99.6) | 160 | 100.0 | - | 163 | 100.0 | - | 0.100 | 163 | 41.7 | (34.5-49.3) |
| Terai | 80 | 97.5 | (90.5-99.4) | 78 | 100.0 | - | 80 | 98.8 | (91.0-99.8) |  | 75 | 62.7 | (50.2-73.6) |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 61 | 96.7 | (87.7-99.2) | 59 | 100.0 | - | 61 | 100.0 |  |  | 59 | 50.8 | (38.4-63.2) |
| Rural | 387 | 99.0 | (96.6-99.7) | 383 | 100.0 | - | 387 | 99.7 | (98.1-100.0) | 1 | 379 | 52.2 | (45.7-58.7) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 86 | 98.8 | (91.8-99.8) | 85 | 100.0 | - | 86 | 100.0 | - |  | 85 | 28.2 | (19.5-39.0) |
| Second | 99 | 99.0 | (92.7-99.9) | 98 | 100.0 | - | 99 | 99.0 | (92.7-99.9) |  | 94 | 60.6 | (52.4-68.3) |
| Middle | 94 | 100.0 |  | 94 | 100.0 | - | 94 | 100.0 | - | 0.473 | 93 | 47.3 | (37.6-57.2) |
| Fourth | 91 | 98.9 | (91.8-99.9) | 90 | 100.0 | - | 99 | 100.0 | - |  | 90 | 67.8 | (57.8-76.4) |
| Highest | 78 | 96.2 | (83.1-99.2) | 75 | 100.0 | - | 78 | 100.0 | - |  | 76 | 55.3 | (41.9-67.9) |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 32 | (100.0) | - | 32 | (100.0) | - | 32 | (100.0) | - |  | 31 | (61.3) | (47.5-73.5) |
| Hill Chhetri | 113 | 100.0 | - | 113 | 100.0 | - | 113 | 100.0 | - |  | 108 | 40.7 | (30.0-52.4) |
| Terai Brahmin/Chhetri | 6 | * | * | 6 | * | * | 6 | * | * |  | 6 | * | * |
| Other Terai caste | 6 | * | * | 5 | * | * | 6 | * | * |  | 6 | * | * |
| Hill Dalit | 39 | (100.0) | - | 39 | (100.0) | - | 39 | (100.0) | - |  | 39 | (41.0) | (29.7-53.4) |
| Terai Dalit | 4 | * | * | 4 | * | * | 4 | * | * | - | 3 | * | * |
| Newar | 37 | (94.6) | (76.6-98.9) | 35 | (100.0) | - | 37 | (100.0) | - |  | 37 | (45.9) | (31.8-60.8) |
| Hill Janajati | 190 | 98.4 | (95.1-99.5) | 187 | 100.0 | - | 190 | 100.0 | - |  | 189 | 57.1 | (48.9-65.0) |
| Terai Janajati | 15 | * | * | 15 | * | * | 15 | * | * |  | 13 | * | * |
| Muslim | 5 | * | * | 5 | * | * | 5 | * | * |  | 5 | * | * |
| Total | 448 | 98.7 | (96.5-99.5) | 442 | 100.0 | (0.0-100.0) | 448 | 99.8 | (98.3-100.0) |  | 438 | 52.1 | (46.4-57.6) |

[^59]Sample size might vary slightly due to missing data.
Significant test did not perform due to small sample size.
a Among those who reported household uses cooking oil and soybean oil is main type used
${ }^{\text {b }}$ Among those who reported they had cooking oil the day of the survey

Table 18.12: Type of Brand of Soybean Oil Used in Household, Nepal National Micronutrient Status Survey, 2016


[^60]Table 18.13: Rice Type Consumed by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Rice type consumed in households ${ }^{\text {a }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Home produced hand pounded Rice |  |  | Small local milled Rice |  |  | Rice from commercial/ large scale mill (industrial rice) |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \text { p- } \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 864 | 13.4 | (8.2-21.2) |  | 53.2 | (43.1-63.0) |  | 53.1 | (42.3-63.6) |  |
| Central | 862 | 7.3 | (5.3-9.9) |  | 53.2 | (46.0-60.3) |  | 64.2 | (57.970.1) |  |
| Western | 859 | 10.7 | (6.2-17.8) | $<0.001$ | 55.1 | (47.6-62.4) | $<0.001$ | 57.8 | (50.0-65.2) | <0.001 |
| Mid-western | 862 | 17.3 | (10.1-28.1) |  | 44.7 | (38.3-51.2) |  | 59.2 | (54.8-63.5) |  |
| Far-western | 862 | 33.1 | (26.2-40.9) |  | 37.5 | (31.6-43.8) |  | 64.1 | (56.6-71.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 719 | 33.3 | (28.0-39.0) |  | 42.4 | (33.2-52.1) |  | 76.8 | (70.0-82.5) |  |
| Hill | 1,794 | 9.7 | (7.3-12.8) | <0.001 | 41.4 | (37.3-45.6) | $<0.001$ | 75.5 | (72.2-78.5) | <0.001 |
| Terai | 1,796 | 13.0 | (9.2-18.2) |  | 61.7 | (54.7-68.2) |  | 41.9 | (35.1-49.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 598 | 7.4 | (2.3-21.6) | $<0.001$ | 35.4 | (24.1-48.7) | $<0.001$ | 74.7 | (62.1-84.1) | <0.001 |
| Rural | 3,711 | 13.8 | (11.0-17.2) | <0.001 | 53.6 | (49.2-58.0) | <0.001 | 57.2 | (52.6-61.7) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1,155 | 23.1 | (18.6-28.3) |  | 35.2 | (31.2-39.4) |  | 78.5 | (75.0-81.6) |  |
| Second | 902 | 15.4 | (12.7-18.5) |  | 62.3 | (57.7-66.7) |  | 54.1 | (49.1-59.1) |  |
| Middle | 813 | 10.3 | (7.2-14.7) | $<0.001$ | 64.3 | (58.7-69.5) | $<0.001$ | 47.0 | (41.2-52.9) | <0.001 |
| Fourth | 789 | 11.1 | (7.4-16.4) |  | 55.8 | (48.4-62.9) |  | 49.2 | (42.6-55.9) |  |
| Highest | 650 | 4.8 | (2.5-8.9) |  | 38.1 | (31.7-44.8) |  | 69.3 | (63.4-74.6) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 551 | 8.6 | (4.8-14.7) |  | 58.5 | (49.8-66.7) |  | 51.9 | (43.8-59.9) |  |
| Hill Chhetri | 1,045 | 14.7 | (10.6-20.2) |  | 48.0 | (42.5-53.5) |  | 67.1 | (61.4-72.4) |  |
| Terai Brahmin/Chhetri | 111 | 37.8 | (16.5-65.1) |  | 35.5 | (24.6-48.0) |  | 44.1 | (26.0-64.0) |  |
| Other Terai caste | 291 | 20.5 | (13.9-29.3) |  | 63.1 | (49.2-75.1) |  | 41.3 | (31.0-52.4) |  |
| Hill Dalit | 510 | 14.7 | (9.5-22.3) | <0.001 | 30.7 | (24.4-37.9) | <0.001 | 80.8 | (75.1-85.4) | <0.001 |
| Terai Dalit | 183 | 17.5 | (8.8-31.8) |  | 54.3 | (38.9-68.8) | <0.001 | 46.3 | (28.8-64.9) | <0.001 |
| Newar | 152 | 1.3 | (0.3-4.5) |  | 28.1 | (19.3-38.9) |  | 82.7 | (68.7-91.3) |  |
| Hill Janajati | 1,027 | 9.3 | (7.4-11.6) |  | 50.2 | (44.7-55.6) |  | 69.0 | (64.1-73.5) |  |
| Terai Janajati | 354 | 11.8 | (5.0-25.5) |  | 73.3 | (60.0-83.3) |  | 29.9 | (19.2-43.3) |  |
| Muslim | 80 | 6.2 | (1.5-21.8) |  | 57.5 | (36.1-76.5) |  | 50.2 | (30.7-69.6) |  |
| Total | 4,309 | 12.9 | (10.6-15.7) |  | 51.1 | (47.2-55.0) |  | 59.6 | (55.8-63.3) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\mathrm{a}}$ Not mutually exclusive; Household asked for each type

Table 18.14: Frequency of Home Produce Pounded Rice Consumed by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Rice Type Consumed by Household ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Home produced hand Pounded Rice Year Round |  |  | Home produced hand Pounded Rice Seasonal |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 123 | 45.7 | (22.2-71.3) |  | 54.3 | (28.7-77.8) |  |
| Central | 57 | 42.1 | (22.7-64.2) |  | 57.9 | (35.8-77.3) |  |
| Western | 96 | 79.6 | (73.1-84.9) | $<0.001$ | 20.4 | (15.1-26.9) | $<0.00$ |
| Mid-western | 160 | 48.1 | (31.0-65.6) |  | 51.9 | (34.4-69.0) |  |
| Far-western | 294 | 23.8 | (13.9-37.6) |  | 76.2 | (62.4-86.1) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 218 | 19.0 | (13.0-26.9) |  | 81.0 | (73.1-87.0) |  |
| Hill | 305 | 31.5 | (23.2-41.2) | $<0.001$ | 68.5 | (58.8-76.8) | $<0.001$ |
| Terai | 207 | 66.9 | (53.2-78.1) |  | 33.1 | (21.9-46.8) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 31 | (47.7) | (37.8-57.8) | 0.836 | (52.3) | (42.2-62.2) | 0.836 |
| Rural | 699 | 46.1 | (35.9-56.6) | 0.836 | 53.9 | (43.4-64.1) | 0.836 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 363 | 22.9 | (16.2-31.2) |  | 77.1 | (68.8-83.8) |  |
| Second | 165 | 41.0 | (31.1-51.6) |  | 59.0 | (48.4-68.9) |  |
| Middle | 82 | 65.4 | (46.0-80.7) | $<0.001$ | 34.6 | (19.3-54.0) | <0.001 |
| Fourth | 77 | 74.2 | (63.1-82.9) |  | 25.8 | (17.1-36.9) |  |
| Highest | 43 | (68.9) | (42.1-87.1) |  | (31.1) | (12.9-57.9) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 78 | 42.0 | (25.6-60.3) |  | 58.0 | (39.7-74.4) |  |
| Hill Chhetri | 260 | 32.6 | (22.3-44.9) |  | 67.4 | (55.1-77.7) |  |
| Terai Brahmin/Chhetri | 33 | (72.8) | (49.2-88.1) |  | (27.2) | (11.9-50.8) |  |
| Other Terai caste | 60 | 68.3 | (46.5-84.2) |  | 31.7 | (15.8-53.5) |  |
| Hill Dalit | 109 | 19.5 | (10.0-34.7) | <0.001 | 80.5 | (65.3-90.0) | <0.001 |
| Terai Dalit | 32 | (65.3) | (40.7-83.7) | 0.001 | (34.7) | (16.3-59.3) | <0.001 |
| Newar | 3 | * | * |  | * | * |  |
| Hill Janajati | 108 | 23.9 | (16.6-33.1) |  | 76.1 | (66.9-83.4) |  |
| Terai Janajati | 41 | (69.4) | (36.0-90.2) |  | (30.6) | (9.8-64.0) |  |
| Muslim | 6 | * | * |  | * | * |  |
| Total | 730 | 46.2 | (37.0-55.7) |  | 53.8 | (44.3-63.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. <br> Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Sample size might vary slightly due to missing data. <br> P-value obtained from Pearson's chi-square test. <br> ${ }^{\text {a }}$ Asked among those reporting household consumes rice type |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Table 18.15: Frequency of Small Local Milled Rice Consumed by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Rice Type Consumed by Household ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Small local milled Rice Year Round |  |  | Small local milled Rice Seasonal |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region <br> Eastern <br> Central <br> Western <br> Mid-western <br> Far-western | $\begin{aligned} & 454 \\ & 466 \\ & 399 \\ & 377 \\ & 304 \end{aligned}$ | $\begin{aligned} & 79.5 \\ & 65.5 \\ & 67.6 \\ & 85.0 \\ & 85.2 \end{aligned}$ | $\begin{aligned} & (73.8-84.2) \\ & (59.3-71.2) \\ & (59.9-74.3) \\ & (78.3-89.9) \\ & (75.2-91.6) \end{aligned}$ | $<0.001$ | $\begin{aligned} & 20.5 \\ & 34.5 \\ & 32.4 \\ & 15.0 \\ & 14.8 \end{aligned}$ | $\begin{array}{r} (15.8-26.2) \\ (28.8-40.7) \\ (25.7-40.1) \\ (10.1-21.7) \\ (8.4-24.8) \\ \hline \end{array}$ | <0.001 |
| Ecological Region <br> Mountain <br> Hill <br> Terai | $\begin{array}{r} 220 \\ 600 \\ 1,180 \end{array}$ | $\begin{aligned} & 46.1 \\ & 63.8 \\ & 81.4 \end{aligned}$ | $\begin{aligned} & (33.1-59.6) \\ & (59.9-67.4) \\ & (76.9-85.2) \\ & \hline \end{aligned}$ | <0.001 | $\begin{aligned} & 53.9 \\ & 36.2 \\ & 18.6 \end{aligned}$ | $\begin{aligned} & (40.4-66.9) \\ & (32.6-40.1) \\ & (14.8-23.1) \end{aligned}$ | <0.001 |
| Location <br> Urban <br> Rural | $\begin{array}{r} 254 \\ 1,746 \end{array}$ | $\begin{aligned} & 70.7 \\ & 73.1 \end{aligned}$ | $\begin{aligned} & (52.5-84.1) \\ & (69.8-76.1) \end{aligned}$ | 0.462 | $\begin{aligned} & 29.3 \\ & 26.9 \end{aligned}$ | $\begin{aligned} & (15.9-47.5) \\ & (23.9-30.2) \end{aligned}$ | 0.462 |
| Sex of Household Head Male <br> Female | $\begin{array}{r} 659 \\ 1,341 \end{array}$ | $\begin{aligned} & 74.4 \\ & 72.1 \end{aligned}$ | $\begin{aligned} & (70.4-78.1) \\ & (68.8-75.2) \end{aligned}$ | 0.257 | $\begin{aligned} & 25.6 \\ & 27.9 \end{aligned}$ | $\begin{aligned} & (21.9-29.6) \\ & (24.8-31.2) \end{aligned}$ | 0.257 |
| Wealth Quintile <br> Lowest <br> Second <br> Middle <br> Fourth <br> Highest | $\begin{aligned} & 295 \\ & 501 \\ & 500 \\ & 435 \\ & 269 \end{aligned}$ | $\begin{aligned} & 54.7 \\ & 69.3 \\ & 75.8 \\ & 79.3 \\ & 81.4 \end{aligned}$ | $\begin{aligned} & (49.3-60.0) \\ & (64.2-73.9) \\ & (70.0-80.7) \\ & (75.5-82.6) \\ & (75.2-86.3) \end{aligned}$ | <0.001 | $\begin{aligned} & 45.3 \\ & 30.7 \\ & 24.2 \\ & 20.7 \\ & 18.6 \end{aligned}$ | $\begin{aligned} & (40.0-50.7) \\ & (26.1-35.8) \\ & (19.3-30.0) \\ & (17.4-24.5) \\ & (13.7-24.8) \end{aligned}$ | <0.001 |
| Ethnicity <br> Hill Brahmin <br> Hill Chhetri <br> Terai Brahmin/Chhetri <br> Other Terai caste <br> Hill Dalit <br> Terai Dalit <br> Newar <br> Hill Janajati <br> Terai Janajati <br> Muslim | $\begin{array}{r} 308 \\ 408 \\ 56 \\ 194 \\ 122 \\ 106 \\ 47 \\ 438 \\ 265 \\ 55 \\ \hline \end{array}$ | 86.2 68.2 80.2 72.2 63.2 79.3 $(63.1)$ 62.5 85.5 79.2 | $\begin{aligned} & (82.4-89.3) \\ & (62.9-73.1) \\ & (50.4-94.2) \\ & (58.2-82.9) \\ & (53.7-71.8) \\ & (60.7-90.5) \\ & (37.3-83.0) \\ & (57.5-67.1) \\ & (78.9-90.3) \\ & (58.5-91.1) \end{aligned}$ | <0.001 | 13.8 31.8 19.8 27.8 36.8 20.7 $(36.9)$ 37.5 14.5 20.8 | $\begin{array}{r} (10.7-17.6) \\ (26.9-37.1) \\ (5.8-49.6) \\ (17.1-41.8) \\ (28.2-46.3) \\ (9.5-39.3) \\ (17.0-62.7) \\ (32.9-42.5) \\ (9.7-21.1) \\ (8.9-41.5) \end{array}$ | <0.001 |
| Total | 2,000 | 72.9 | (69.7-75.8) |  | 27.1 | (24.2-30.3) |  |

[^61]Table 18.16: Frequency of Commercial/Large Scale Milled Rice Consumed by Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Rice Type Consumed by Household ${ }^{\text {a }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Rice from commercial/large scale mill (industrial rice)Year Round |  |  | Rice from commercial/large scale mill (industrial rice) Seasonal |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |
| Eastern | 492 | 74.9 | (67.1-81.4) |  | 25.1 | (18.6-32.9) |  |
| Central | 564 | 71.8 | (66.5-76.5) |  | 28.2 | (23.5-33.5) |  |
| Western | 523 | 77.6 | (71.3-82.8) | 0.071 | 22.4 | (17.2-28.7) | 0.071 |
| Mid-western | 522 | 76.9 | (64.2-86.0) |  | 23.1 | (14.0-35.8) |  |
| Far-western | 564 | 71.2 | (65.6-76.2) |  | 28.8 | (23.8-34.4) |  |
| Ecological Region |  |  |  |  |  |  |  |
| Mountain | 595 | 62.4 | (55.5-68.8) |  | 37.6 | (31.2-44.5) |  |
| Hill | 1,391 | 77.5 | (73.7-81.0) | $<0.001$ | 22.5 | (19.0-26.3) | $<0.001$ |
| Terai | 679 | 71.6 | (65.1-77.3) |  | 28.4 | (22.7-34.9) |  |
| Location |  |  |  |  |  |  |  |
| Urban | 411 | 82.1 | (71.5-89.3) | <0.001 | 17.9 | (10.7-28.5) |  |
| Rural | 2,254 | 72.5 | (68.7-76.0) | <0.001 | 27.5 | (24.0-31.3) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |
| Lowest | 953 | 71.7 | (65.9-76.9) |  | 28.3 | (23.1-34.1) |  |
| Second | 523 | 62.6 | (57.8-67.1) |  | 37.4 | (32.9-42.2) |  |
| Middle | 386 | 67.9 | (61.3-73.9) | $<0.001$ | 32.1 | (26.1-38.7) | $<0.001$ |
| Fourth | 389 | 77.9 | (71.4-83.3) |  | 22.1 | (16.7-28.6) |  |
| Highest | 414 | 87.6 | (83.1-91.0) |  | 12.4 | (9.0-16.9) |  |
| Ethnicity |  |  |  |  |  |  |  |
| Hill Brahmin | 297 | 72.4 | (63.6-79.7) |  | 27.6 | (20.3-36.4) |  |
| Hill Chhetri | 728 | 70.9 | (65.4-75.9) |  | 29.1 | (24.1-34.6) |  |
| Terai Brahmin/Chhetri | 38 | (67.9) | (41.3-86.4) |  | (32.1) | (13.6-58.7) |  |
| Other Terai caste | 106 | 57.8 | (45.2-69.5) |  | 42.2 | (30.5-54.8) |  |
| Hill Dalit | 422 | 81.5 | (75.4-86.4) | <0.001 | 18.5 | (13.6-24.6) | <0.001 |
| Terai Dalit | 80 | 70.9 | (57.9-81.2) | <0.001 | 29.1 | (18.8-42.1) | <0.001 |
| Newar | 118 | 93.9 | (87.7-97.1) |  | 6.1 | (2.9-12.3) |  |
| Hill Janajati | 753 | 75.1 | (70.5-79.3) |  | 24.9 | (20.7-29.5) |  |
| Terai Janajati | 89 | 66.5 | (53.5-77.4) |  | 33.5 | (22.6-46.5) |  |
| Muslim | 30 | (80.5) | (55.8-93.1) |  | (19.5) | (6.9-44.2) |  |
| Total | 2,665 | 74.2 | (71.0-77.1) |  | 25.8 | (22.9-29.0) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. Sample size might vary slightly due to missing data |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test.a ${ }^{\text {asked among those reporting household consumes rice type }}$ |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Table 18.17: Estimated Per Capita Daily Availability of Rice in the Household, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Per capita availability of rice in the housheold ${ }^{\text {a, }}$ b |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Rice fromcommercial/arge scalemill |  | Rice from small local mill |  | Any Rice |  |
|  | N | Median g/day | N | Median g/day | N | Median g/day |
| Development Region |  |  |  |  |  |  |
| Eastern | 491 | 277.8 | 100 | 277.8 | 570 | 277.8 |
| Central | 562 | 231.5 | 46 | (200.7) | 595 | 238.1 |
| Western | 521 | 208.3 | 72 | 222.2 | 582 | 238.1 |
| Mid-western | 509 | 250.0 | 67 | 277.8 | 573 | 250.0 |
| Far-western | 546 | 250.0 | 18 | * | 563 | 250.0 |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 594 | 250.0 | 16 | * | 607 | 250.0 |
| Hill | 1,384 | 250.0 | 72 | 266.7 | 1,441 | 250.0 |
| Terai | 651 | 231.5 | 215 | 138.1 | 835 | 250.0 |
| Location |  |  |  |  |  |  |
| Urban | 402 | 222.2 | 303 | 250.0 | 448 | 238.1 |
| Rural | 2,227 | 250.0 | 58 | 222.2 | 2,435 | 250.0 |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 952 | 277.8 | 41 | (277.8) | 986 | 277.8 |
| Second | 519 | 210.5 | 72 | 138.1 | 584 | 238.1 |
| Middle | 377 | 250.0 | 74 | 250.0 | 437 | 250.0 |
| Fourth | 378 | 250.0 | 68 | 250.0 | 439 | 250.0 |
| Highest | 403 | 208.3 | 48 | (222.2) | 437 | 238.1 |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 285 | 208.3 | 32 | (277.8) | 307 | 208.3 |
| Hill Chhetri | 722 | 250.0 | 44 | (277.8) | 761 | 250.0 |
| Terai Brahmin/Chhetri | 38 | (208.3) | 10 | * | 46 | (194.4) |
| Other Terai caste | 105 | 208.3 | 36 | (187.5) | 135 | 222.2 |
| Hill Dalit | 419 | 277.8 | 27 | (250.0) | 446 | 277.8 |
| Terai Dalit | 79 | 250.0 | 33 | (250.0) | 107 | 250.0 |
| Newar | 118 | 250.0 | 8 |  | 124 | 250.0 |
| Hill Janajati | 748 | 250.0 | 70 | 277.8 | 804 | 250.0 |
| Terai Janajati | 81 | 250.0 | 34 | (266.7) | 111 | 250.0 |
| Muslim | 30 | (277.8) | 9 | * | 38 | (208.3) |
|  | 2,629 | 250.0 | 303 | 250.0 | 2,883 | 250.0 |

[^62]Table 18.18: Rice Availability on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016


[^63]Table 18.19: Observation of Rice Used in the Households on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics |  | Observed ${ }^{\text {a }}$ |  |  |  |  |  | In original packaging ${ }^{\text {b }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Small local milled rice |  |  | Commercial large scale milled rice |  |  | Small local milled rice |  |  | Commercial large scale milled rice |  |  |
|  |  | N | \% | (95\% CI) | N | \% | (95\% CI) | N | \% | (95\% CI) | N | \% | (95\% CI) |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern |  | 81 | 98.4 | (89.7-99.8) | 440 | 99.2 | (97.3-99.8) | 80 | 13.7 | (6.1-28.0) | 438 | 55.0 | (49.0-60.8) |
| Central |  | 33 | (100.0) | (100.0-100.0) | 494 | 99.5 | (98.0-99.9) | 33 | (9.6) | (3.2-25.6) | 491 | 47.3 | (39.9-54.8) |
| Western |  | 60 | 96.5 | (86.2-99.2) | 500 | 99.3 | (97.8-99.8) | 58 | 5.1 | (1.9-12.6) | 496 | 54.2 | (47.7-60.6) |
| Mid-western |  | 64 | 98.4 | (88.7-99.8) | 467 | 99.7 | (98.1-100.0) | 63 | 14.5 | (7.5-26.4) | 466 | 54.7 | (49.8-59.4) |
| Far-western |  | 16 | * | * | 506 | 100.0 | (0.0-100.0) | 16 | * | * | 506 | 70.6 | (67.0-73.9) |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain |  | 13 | * | * | 550 | 100.0 | (99.9-100.0) | 13 | * | * | 549 | 71.9 | (67.2-76.3) |
| Hill |  | 59 | 100.0 | (0.0-100.0) | 1,288 | 99.7 | (99.0-99.9) | 59 | 0.0 | - | 1,285 | 55.3 | (51.5-59.0) |
| Terai |  | 182 | 97.9 | (94.2-99.3) | 569 | 99.0 | (97.4-99.6) | 178 | 14.1 | (8.5-22.4) | 563 | 44.6 | (36.9-52.7) |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban |  | 47 | (100.0) | (0.0-100.0) | 370 | 99.3 | (96.6-99.8) | 47 | (15.5) | (4.3-42.9) | 367 | 36.9 | (30.6-43.6) |
| Rural |  | 207 | 98.1 | (94.9-99.3) | 2,037 | 99.5 | (99.0-99.8) | 203 | 10.1 | (5.4-18.2) | 2,030 | 56.9 | (53.4-60.2) |
| Sex of Household Head |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male |  | 81 | 97.1 | (88.6-99.3) | 707 | 99.7 | (97.9-100.0) | 79 | 17.8 | (10.0-29.7) | 705 | 55.7 | (50.3-61.0) |
| Female |  | 173 | 99.1 | (96.4-99.8) | 1,700 | 99.4 | (98.7-99.7) | 171 | 7.5 | (4.4-12.6) | 1,692 | 52.4 | (48.8-56.0) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest |  | 38 | (97.6) | (84.5-99.7) | 884 | 99.9 | (99.1-100.0) | 37 | 14.2 | (6.2-29.3) | 883 | 59.5 | (56.5-62.5) |
| Second |  | 61 | 100.0 | (0.0-100.0) | 460 | 99.6 | (97.3-99.9) | 61 | 14.6 | (5.0-35.7) | 458 | 57.0 | (52.0-61.8) |
| Middle |  | 66 | 97.7 | (84.2-99.7) | 337 | 99.7 | (98.1-100.0) | 65 | 13.5 | (5.8-28.3) | 336 | 53.6 | (47.0-60.1) |
| Fourth |  | 52 | 98.7 | (90.8-99.8) | 347 | 98.7 | (96.5-99.6) | 51 | 1.4 | (0.2-8.9) | 344 | 51.8 | (43.4-60.1) |
| Highest |  | 37 | (97.7) | (85.0-99.7) | 379 | 99.3 | (97.7-99.8) | 36 | (9.6) | (3.2-25.1) | 376 | 44.8 | (35.8-54.1) |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin |  | 27 | (100.0) | (0.0-100.0) | 254 | 99.7 | (97.9-100.0) | 27 | (19.1) | (6.3-45.2) | 253 | 59.3 | (50.0-68.1) |
| Hill Chhetri |  | 38 | (100.0) | (0.0-100.0) | 660 | 98.9 | (96.8-99.6) | 38 | (6.2) | (2.2-16.0) | 656 | 59.0 | (54.2-63.7) |
| Terai Brahmin/Chhetri |  | 6 | * | * | 32 | (100.0) | (0.0-100.0) | 6 | * | * | 32 | (42.2) | (19.0-69.5) |
| Other Terai caste |  | 28 | (100.0) | (0.0-100.0) | 83 | 100.0 | (0.0-100.0) | 28 | (6.9) | (1.6-25.4) | 83 | 39.9 | (28.2-52.7) |
| Hill Dalit |  | 24 | * | , | 398 | 99.0 | (95.6-99.8) | 23 | (18.5) | (5.2-48.2) | 396 | 53.0 | (45.9-59.9) |
| Terai Dalit |  | 30 | (100.0) | (0.0-100.0) | 68 | 100.0 | (0.0-100.0) | 30 | (16.7) | (4.1-48.6) | 68 | 40.0 | (29.2-52.0) |
| Newar |  | 6 | * | * | 115 | 100.0 | (0.0-100.0) | 6 | * | (1.4-48.9) | 115 | 37.5 | (27.8-48.4) |
| Hill Janajati |  | 59 | 97.4 | (89.4-99.4) | 702 | 99.6 | (98.3-99.9) | 57 | 8.8 | (2.4-27.8) | 699 | 59.4 | (55.1-63.56) |
| Terai Janajati |  | 29 | (97.4) | (83.0-99.7) | 64 | 100.0 | (0.0-100.0) | 28 | (11.4) | (3.3-32.3) | 64 | 52.0 | (41.2-62.6) |
| Muslim |  | 7 | * | * | 27 | (100.0) | (0.0-100.0) | 7 | * | * | 27 | (24.3) | (10.5-46.6) |
|  | Total | 254 | 98.4 | (95.5-99.5) | 2407 | 99.5 | (98.9-99.7) | 250 | 11.0 | (6.8-17.5) | 2397 | 53.4 | (50.0-56.7) |

[^64]Sample size might vary slightly due to missing
Sample size might vary slightly due to missing data.
Significant test did not perform due to small sample size
${ }^{\text {a }}$ Among those who reported they had rice in the household the day of the survey
${ }^{\mathrm{b}}$ Among those who observed rice in the household the day of the survey.

Table 18.20: Type of Brand of Commercial Large Scale Milled Rice Available in the Household on Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Rice from Commercial/Large Scale Mill (Industrial Rice) ${ }^{\text {a,b,c }}$ |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Brand |  |  |  |  |  |  |  |  |
|  |  | No brand |  |  | Nepal |  |  | India |  |  |
|  |  | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |  |  |  |  |  |  |
| Eastern | 247 | 0.6 | (0.2-1.7) |  | 76.1 | (62.2-86.0) |  | 23.3 | (13.4-37.4) |  |
| Central | 236 | 1.1 | (0.2-6.8) |  | 81.7 | (75.3-86.7) |  | 17.3 | (13.1-22.4) |  |
| Western | 265 | 8.8 | (3.4-21.2) | $<0.001$ | 83.0 | (76.6-87.9) | <0.001 | 8.2 | (2.3-25.2) | <0.001 |
| Mid-western | 262 | 5.6 | (2.8-10.9) |  | 83.2 | (77.0-88.0) |  | 11.2 | (7.1-17.2) |  |
| Far-western | 355 | 0.3 | (0.0-2.3) |  | 95.5 | (80.4-99.1) |  | 4.2 | (0.7-20.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |
| Mountain | 384 | 1.7 | (0.6-4.5) |  | 93.5 | (91.6-95.0) |  | 4.8 | (2.6-8.8) |  |
| Hill | 735 | 3.8 | (1.9-7.5) | 0.094 | 85.8 | (82.4-88.6) | <0.001 | 10.4 | (7.3-14.6) | <0.001 |
| Terai | 246 | 1.9 | (0.7-5.4) |  | 70.3 | (57.4-80.6) |  | 27.8 | (17.7-40.8) |  |
| Location |  |  |  |  |  |  |  |  |  |  |
| Urban | 141 | 0.9 | (0.2-3.8) |  | 65.9 | (45.8-81.5) |  | 33.2 | (17.6-53.6) |  |
| Rural | 1,224 | 3.3 | (1.9-5.9) |  | 84.9 | (79.4-89.1) |  | 11.8 | (7.7-17.6) | <0.001 |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |
| Lowest | 552 | 3.0 | (1.5-5.8) |  | 92.2 | (89.2-94.3) |  | 4.9 | (2.9-8.0) |  |
| Second | 280 | 5.9 | (2.9-11.3) |  | 85.2 | (80.6-88.9) |  | 8.9 | (5.4-14.4) |  |
| Middle | 184 | 1.7 | (0.5-5.9) | 0.058 | 84.3 | (71.7-92.0) | <0.001 | 14.0 | (6.7-26.8) | <0.001 |
| Fourth | 185 | 2.4 | (0.8-6.8) |  | 76.2 | (68.1-82.9) |  | 21.3 | (14.7-29.8) |  |
| Highest | 164 | 2.0 | (0.4-10.1) |  | 69.4 | (58.2-78.7) |  | 28.5 | (19.8-39.2) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 157 | 2.8 | (0.7-11.0) |  | 90.7 | (82.6-95.2) |  | 6.6 | (2.9-14.0) |  |
| Hill Chhetri | 418 | 4.7 | (2.4-8.8) |  | 85.9 | (72.8-93.2) |  | 9.5 | (4.1-20.5) |  |
| Terai Brahmin/Chhetri | 12 | * |  |  |  | * |  | * | (4.5) |  |
| Other Terai caste | 32 | (0.0) | - |  | (52.8) | (27.7-76.5) |  | (47.2) | (23.5-72.3) |  |
| Hill Dalit | 220 | 1.2 | (0.4-3.6) |  | 93.2 | (85.6-96.9) |  | 5.6 | (2.3-12.9) |  |
| Terai Dalit | 26 | (0.0) | - | 0.150 | (55.9) | (31.4-77.8) | <0.001 | (44.1) | (22.2-68.6) | <0.001 |
| Newar | 46 | (0.0) | - |  | (77.1) | (50.7-91.7) |  | (22.9) | (8.3-49.3) |  |
| Hill Janajati | 416 | 3.9 | (1.7-8.4) |  | 84.3 | (80.9-87.2) |  | 11.8 | (7.8-17.5) |  |
| Terai Janajati | 31 | (3.8) | (0.8-16.1) |  | (83.8) | (70.0-91.9) |  | (12.4) | (5.2-26.7) |  |
| Muslim | 6 | * | * |  | * | * |  | * | * |  |
| Total | 1,365 | 3.1 | (1.8-5.3) |  | 82.6 | (78.6-86.0) |  | 14.4 | (10.9-18.7) |  |

[^65]Table 18.21: Consumption of Biscuits/Cookies in Households, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Biscuits/Cookies |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Household members consume biscuits/ cookies in household or outside household |  |  |
|  |  | \% | (95\% CI) | p-value |
| Development Region |  |  |  |  |
| Eastern | 864 | 95.5 | (92.7-97.2) |  |
| Central | 862 | 97.6 | (96.4-98.4) |  |
| Western | 859 | 92.1 | (90.0-93.9) | $<0.001$ |
| Mid-western | 862 | 96.1 | (94.6-97.3) |  |
| Far-western | 862 | 95.4 | (93.6-96.7) |  |
| Ecological Region |  |  |  |  |
| Mountain | 719 | 96.4 | (94.0-97.8) |  |
| Hill | 1,794 | 95.4 | (94.3-96.3) | 0.728 |
| Terai | 1,796 | 95.7 | (94.2-96.8) |  |
| Location |  |  |  |  |
| Urban | 598 | 96.2 | (90.9-98.5) | 0.482 |
| Rural | 3,711 | 95.5 | (94.7-96.2) | 0.482 |
|  |  |  |  |  |
| Male | 1,369 | 94.6 | (92.7-96.0) | 0.020 |
| Female | 2,940 | 96.1 | (95.4-96.8) | 0.020 |
| Wealth Quintile |  |  |  |  |
| Lowest | 1,155 | 93.5 | (91.5-95.1) |  |
| Second | 902 | 94.3 | (91.7-96.1) |  |
| Middle | 813 | 95.1 | (93.3-96.5) | <0.001 |
| Fourth | 789 | 97.1 | (95.5-98.1) |  |
| Highest | 650 | 98.1 | (96.2-99.1) |  |
| Ethnicity |  |  |  |  |
| Hill Brahmin | 551 | 96.0 | (93.8-97.5) |  |
| Hill Chhetri | 1,045 | 95.8 | (93.3-97.4) |  |
| Terai Brahmin/Chhetri | 111 | 93.8 | (83.3-97.8) |  |
| Other Terai caste | 291 | 96.5 | (92.8-98.3) |  |
| Hill Dalit | 510 | 95.7 | (92.7-97.5) |  |
| Terai Dalit | 183 | 92.2 | (81.3-97.0) | 0.006 |
| Newar | 152 | 100.0 | (0.0-100.0) |  |
| Hill Janajati | 1,027 | 94.4 | (92.7-95.8) |  |
| Terai Janajati | 354 | 96.7 | (93.9-98.3) |  |
| Muslim | 80 | 97.7 | (87.6-99.6) |  |
|  | 4,309 | 95.6 | (94.8-96.3) |  |

[^66]Table 18.22: Estimated Per Capita Daily Availability of Biscuit in the Households, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Sample size might vary slightly due to missing data.
${ }^{\text {a }}$ Asked for Biscuit used in households.
${ }^{\text {b }}$ Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household members.

Table 18.23: Observation of Biscuits Used in the Households on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | Biscuits |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Reported have biscuits the day of the survey ${ }^{\text {a }}$ |  |  |  | Observed ${ }^{\text {b }}$ |  |  |  | In original packaging ${ }^{\text {c }}$ |  |  |  |
|  | N | \% | (95\% CI) | p-value | N | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | N | \% | (95\% CI) | $\begin{gathered} \mathrm{p}- \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 826 | 10.1 | (7.9-12.9) |  | 77 | 95.4 | (84.2-98.8) |  | 74 | 98.1 | (87.2-99.7) |  |
| Central | 843 | 15.0 | (12.7-17.6) |  | 117 | 97.9 | (93.2-99.4) |  | 114 | 94.7 | (84.0-98.4) |  |
| Western | 785 | 10.0 | (7.3-13.6) | $<0.001$ | 100 | 90.8 | (84.8-94.6) | 0.066 | 93 | 96.2 | (83.3-99.2) | 0.651 |
| Mid-western | 829 | 4.4 | (3.1-6.2) |  | 39 | (100.0) | - |  | 39 | (93.9) | (79.1-98.4) |  |
| Far-western | 823 | 5.4 | (3.2-9.0) |  | 47 | (100.0) | - |  | 47 | (100.0) | - |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 675 | 8.0 | (5.3-11.7) |  | 73 | 94.8 | (80.2-98.8) |  | 71 | 100.0 | - |  |
| Hill | 1712 | 13.4 | (11.3-15.7) | $<0.001$ | 162 | 98.7 | (98.4-99.0) | 0.006 | 160 | 95.9 | (86.8-98.8) | 0.600 |
| Terai | 1719 | 8.5 | (7.1-10.2) |  | 145 | 92.8 | (85.9-96.5) |  | 136 | 95.4 | (88.4-98.3) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 578 | 15.9 | (10.0-24.3) | <0.001 | 87 | 99.1 | (94.0-99.9) | 121 | 86 | 93.5 | (82.3-97.8) |  |
| Rural | 3528 | 9.8 | (7.8-12.3) |  | 293 | 95.5 | (91.9-97.6) | 121 | 281 | 96.6 | (91.7-98.6) | 158 |
| Sex of Household <br> Head |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 1295 | 10.3 | (8.6-12.4) | 0.607 | 107 | 95.7 | (86.8-98.7) |  | 104 | 94.1 | (81.3-98.3) | 0.306 |
| Female | 2811 | 10.8 | (9.4-12.4) |  | 273 | 96.5 | (93.3-98.2) | 0.654 | 263 | 96.7 | (91.3-98.8) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 1079 | 2.2 | (1.4-3.4) |  | 25 | (89.3) | (52.3-98.4) |  | 24 | * | * |  |
| Second | 854 | 6.3 | (4.5-8.8) |  | 58 | 94.5 | (84.5-98.2) |  | 55 | 100.0 | - |  |
| Middle | 773 | 10.0 | (8.2-12.1) | <0.001 | 74 | 94.4 | (83.1-98.3) | 0.214 | 71 | 97.5 | (84.0-99.6) | 0.011 |
| Fourth | 763 | 11.2 | (8.9-13.9) |  | 94 | 97.4 | (92.4-99.1) |  | 91 | 100.0 | - |  |
| Highest | 637 | 23.1 | (19.7-26.9) |  | 129 | 97.6 | (92.3-99.3) |  | 126 | 92.3 | (81.1-97.1) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 527 | 15.4 | (11.7-20.0) |  | 67 | 99.0 | (93.1-99.9) |  | 66 | 91.4 | (79.8-96.7) |  |
| Hill Chhetri | 1000 | 12.3 | (8.9-16.8) |  | 83 |  | (94.4-99.9) |  | 82 | 96.4 | (87.3-99.0) |  |
| Terai <br> Brahmin/Chhetri | 105 |  | (8.6-21.7) |  | 14 | * | * |  | 14 | * | * |  |
| Other Terai caste | 281 | 7.9 | (5.3-11.6) |  | 22 | * | * |  | 20 | * | * |  |
| Hill Dalit | 487 | 4.0 | (2.5-6.3) | $<0.001$ | 16 | * | * | 0.004 | 13 | * | * | 0.211 |
| Terai Dalit | 171 | 5.0 | (2.3-10.4) |  | 8 | * | * |  | 8 | * | * |  |
| Newar | 152 | 27.2 | (19.7-36.2) |  | 38 | 97.4 | (83.3-99.7) |  | 37 | (94.0) | (72.0-99.0) |  |
| Hill Janajati | 959 | 9.1 | (7.4-11.2) |  | 106 | 95.4 | (87.6-98.4) |  | 102 | 99.2 | (94.5-99.9) |  |
| Terai Janajati | 340 | 7.0 | (4.3-11.2) |  | 22 | * | * |  | 21 | * | * |  |
| Muslim | 79 | 5.2 | (2.0-13.1) |  | 4 | * | * |  | 4 | * | * |  |
| Total | 4106 | 10.7 | (9.4-12.1) |  | 380 | 96.3 | (93.6-97.9) |  | 367 | 95.9 | (90.9-98.2) |  |

[^67]Table 18.24: Type of Brand of Biscuits/Cookies Available in the Household on the Day of the Survey, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Biscuits/cookies ${ }^{\text {a }}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Brand |  |  |  |
|  |  | Nepal ${ }^{\text {b,c }}$ |  | India ${ }^{\text {b,c }}$ |  |
|  |  | \% | (95\% CI) | \% | (95\% CI) |
| Development Region |  |  |  |  |  |
| Eastern | 73 | 79.5 | (61.7-90.3) | 20.5 | (9.7-38.3) |
| Central | 108 | 82.4 | (73.0-89.1) | 16.7 | (10.9-24.6) |
| Western | 91 | 81.3 | (69.1-89.4) | 18.7 | (10.6-30.9) |
| Mid-western | 37 | (89.2) | (78.6-94.9) | 10.8 | (5.1-21.4) |
| Far-western | 47 | (74.5) | (58.3-85.9) | (25.5) | (14.1-41.7) |
| Ecological Region |  |  |  |  |  |
| Mountain | 71 | 97.2 | (83.7-99.6) | 2.8 | (0.4-16.3) |
| Hill | 154 | 86.4 | (79.2-91.3) | 13.0 | (8.6-19.1) |
| Terai | 131 | 66.4 | (55.3-76.0) | 33.6 | (24.0-44.7) |
| Location |  |  |  |  |  |
| Urban | 83 | 67.5 | (53.6-78.8) | 32.5 | (21.2-46.4) |
| Rural | 273 | 85.3 | (79.9-89.5) | 14.3 | (10.3-19.5) |
| Wealth Quintile |  |  |  |  |  |
| Lowest | 17 | * | * | * | * |
| Second | 33 | (97.0) | (80.9-99.6) | (3.0) | (0.4-19.1) |
| Middle | 71 | 88.7 | (79.7-94.0) | 11.3 | (6.0-20.3) |
| Fourth | 91 | 83.5 | (75.5-89.3) | 16.5 | (10.7-24.5) |
| Highest | 144 | 70.8 | (61.5-78.7) | 28.5 | (21.0-37.3) |
| Ethnicity |  |  |  |  |  |
| Hill Brahmin | 62 | 74.2 | (60.6-84.3) | 25.8 | (15.7-39.4) |
| Hill Chhetri | 79 | 86.1 | (74.1-93.0) | 12.7 | (6.6-22.8) |
| Terai Brahmin/Chhetri | 13 | * | * | * | * |
| Other Terai caste | 20 | * | * | * | * |
| Hill Dalit | 13 | * | * | * | * |
| Terai Dalit | 8 | * | * | * | * |
| Newar | 35 | (77.1) | (62.0-87.5) | (22.9) | (12.5-38.0) |
| Hill Janajati | 101 | 94.1 | (86.4-97.5) | 5.9 | (2.5-13.6) |
| Terai Janajati | 21 | (85.7) | (66.0-94.9) | (14.3) | (5.1-34.0) |
| Muslim | 4 | * | * | * | * |
|  | 356 | 81.2 | (75.7-85.7) | 18.5 | (14.2-23.8) |
| Note: Both Ns and estimates are unweighted. |  |  |  |  |  |
| Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. <br> Sample size might vary slightly due to missing data. <br> Significant test did not perform due to small sample size. <br> ${ }^{\text {a }}$ Among those who reported household consumes biscuits/cookies ( $\mathrm{n}=4,119$ ) <br> ${ }^{\mathrm{b}}$ Among those who reported they had biscuits/cookies the day of the survey ( $\mathrm{n}=380$ ) <br> ${ }^{\mathrm{c}}$ Among those with observed biscuits/cookies in the original packaging ( $\mathrm{n}=356$ ) |  |  |  |  |  |

Table 18.25: Fortification Statements on Packaging of Biscuits or Cookies, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Biscuits/cookies ${ }^{\text {a }}$ |  |
| :---: | :---: | :---: | :---: |
|  |  | Biscuits/cookies label says fortified with Iron |  |
|  |  | \% | (95\% CI) |
| Development Region |  |  |  |
| Eastern | 73 | 16.4 | (10.0-25.8) |
| Central | 108 | 5.6 | (2.9-10.3) |
| Western | 91 | 9.9 | (4.9-19.0) |
| Mid-western | 37 | (8.1) | (3.3-18.4) |
| Far-western | 47 | (14.9) | (6.7-30.0) |
| Ecological Region |  |  |  |
| Mountain | 71 | 7.0 | (2.9-16.1) |
| Hill | 154 | 7.8 | (5.0-12.0) |
| Terai | 131 | 15.3 | (9.9-22.8) |
| Location |  |  |  |
| Urban | 83 | 14.5 | (8.5-23.5) |
| Rural | 273 | 9.2 | (6.1-13.4) |
| Wealth Quintile |  |  |  |
| Lowest | 17 | * | * |
| Second | 33 | (3.0) | (0.4-20.1) |
| Middle | 71 | 12.7 | (7.2-21.4) |
| Fourth | 91 | 14.3 | (8.4-23.4) |
|  | 144 | 9.7 | (6.0-15.3) |
| Ethnicity |  |  |  |
| Hill Brahmin | 62 | 6.5 | (3.0-13.3) |
| Hill Chhetri | 79 | 13.9 | (7.9-23.5) |
| Terai Brahmin/Chhetri | 13 | * | * |
| Other Terai caste | 20 | * | * |
| Hill Dalit | 13 | * | * |
| Terai Dalit | 8 | * | * |
| Newar | 35 | (0.0) | - |
| Hill Janajati | 101 | 7.9 | (3.8-15.7) |
| Terai Janajati | 21 | * | * |
| Muslim | 4 | * | * |
|  | 356 | 10.4 | (7.7-13.8) |

Note: Both Ns and estimates are unweighted.
Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Significant test did not perform due to small sample size.
${ }^{\text {a }}$ Among those who reported household consumes, had the day of the survey and observed in the original packaging

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## ANNEXES

## Annex

## Annex 1: Design Effect for Biomarkers of Micronutrient Status

| Biomarker | Design Effect |
| :---: | :---: |
| Children 6-59 months |  |
| Anemia (altitude-adjusted hemoglobin $<11 \mathrm{~g} / \mathrm{dL}$ ) ${ }^{\text {a }}$ | 2.5 |
| Iron deficiency (inflammation-adjusted ferritin $<12 \mu \mathrm{~g} / \mathrm{L}$ ) ${ }^{\text {b }}$ | 2.1 |
| Vitamin A deficiency (MRDR $\geq 0.060$ ) | 1.9 |
| RBC folate deficiency (<305.0 nmol/L) ${ }^{\text {d }}$ | 4.1 |
| Zinc deficiency (inflammation-adjusted zinc $<65 \mu \mathrm{~g} / \mathrm{dL}$ before noon or $<57 \mu \mathrm{~g} / \mathrm{dL}$ noon to midnight) ${ }^{\text {e }}$ | 2.2 |
| Non-pregnant adolescent girls 10-19 years |  |
| Anemia (altitude-adjusted hemoglobin $<11.5 \mathrm{~g} / \mathrm{dL}$ for 10-11y; $<12 \mathrm{~g} / \mathrm{dL}$ for 12y and older) ${ }^{\text {a }}$ | 3.0 |
| Iron deficiency (inflammation-adjusted ferritin $<15 \mu \mathrm{~g} / \mathrm{L}$ ) ${ }^{\text {b }}$ | 2.0 |
| RBC folate deficiency ( $<305.0 \mathrm{nmol} / \mathrm{L}$ ) ${ }^{\text {d }}$ | 2.0 |
| Adolescent boys 10-19 years |  |
| Anemia (altitude-adjusted hemoglobin<11 g/dL) ${ }^{\text {a }}$ | 1.8 |
| Iron deficiency (inflammation-adjusted ferritin<12 $\mu \mathrm{g} / \mathrm{L}$ ) ${ }^{\text {b }}$ | 2.1 |
| Non-pregnant women of reproductive age 15-49 years |  |
| Anemia (altitude - and smoking-adjusted hemoglobin $<12 \mathrm{~g} / \mathrm{dL})^{\text {a }}$ | 2.5 |
| Iron deficiency (inflammation-adjusted ferritin $<15 \mu \mathrm{~g} / \mathrm{L}$ ) ${ }^{\text {b }}$ | 2.0 |
| Vitamin A deficiency (MRDR $\geq 0.060$ ) | 1.4 |
| RBC folate deficiency ( $<305.0 \mathrm{nmol} / \mathrm{L}$ ) ${ }^{\text {d }}$ | 3.1 |
| Zinc deficiency (zinc $<66 \mu \mathrm{~g} / \mathrm{dL}$ before noon or $<59 \mu \mathrm{~g} / \mathrm{dL}$ noon to midnight) ${ }^{\text {e }}$ | 2.5 |
| Pregnant women of reproductive age 15-49 years |  |
| Anemia (altitude- and smoking-adjusted hemoglobin $<11 \mathrm{~g} / \mathrm{dL})^{\text {a }}$ | 2.3 |
| Iron deficiency (inflammation-adjusted ferritin $<12 \mu \mathrm{~g} / \mathrm{L}$ ) ${ }^{\text {b }}$ | 2.4 |
| ${ }^{a}$ WHO 2011. <br> ${ }^{\mathrm{b}}$ UNICEF, United Nations University, WHO 2001. <br> ${ }^{\text {c }}$ WHO 2008. <br> ${ }^{\text {d }}$ Risk of folate deficiency $<305.0 \mathrm{nmol} / \mathrm{L}$ (IOM 1998). <br> ${ }^{\mathrm{e}}$ IZINCG 2007. |  |

## External and Internal Quality Control

## External Quality Assurance

All international laboratories involved in the analysis of the biological specimens have participated in CDC external quality assurance (EQA) programs for applicable biomarkers, including the Vitamin A Laboratory and External Quality Assurance (VITAL-EQA) which includes quality assurance (QA) for ferritin, vitamin A (retinol and retinol binding protein [RBP]), C-reactive protein (CRP), and red blood cell (RBC) folate, and the EQUIP (Ensuring the Quality of Urinary Iodine Procedures) program for urinary iodine. The VITAL-EQA program participation consists of two rounds per year and the EQUIP program consists of three rounds per year. The QA analysis for VITAL-EQA is based on exercises immediately preceding and during the laboratory analysis of the survey specimens (Rounds 26-27), and those for EQUIP are based on rounds analyzed during year 2016.

The VitMin Lab (Willstaett, Germany) has participated in CDC’s EQA program, VITAL-EQA, since 2006. The laboratory measures ferritin, RBP, and CRP concentrations in plasma using a sandwich enzyme-linked immunosorbent assay (ELISA) technique. The precision and bias were Optimal and Desirable for ferritin, sTfR, CRP, and RBP ( $>90-95 \%$ precision of the VITAL-EQA results, with $<0.5 \%$ bias for ferritin and CRP, $3.1 \%$ bias for sTfR, and $4.0 \%$ bias for RBP) (Erhardt, 2004; Haynes, 2008). Alpha-1 acid glycoprotein (AGP) is also measured as part of the ELISA, but the biomarker is not currently part of any EQA program at CDC.

The Peking University, Institute of Reproductive and Child Health laboratory (Beijing, China) has participated in the VITAL-EQA program since 2012. The laboratory measures folate concentrations in RBC hemolysate using the microbiological assay. The precision and bias were Optimal or Desirable (>90\% precision of the VITAL-EQA results, with $4.0 \%$ bias) for folate (Haynes, 2008).

The Institute of Nutrition of Central American and and Panama (INCAP) (Guatemala City, Guatemala) currently participates in the EQUIP program at CDC (Makhmudov, 2011) since 2009 and performs satisfactory. INCAP does not participate in the VITAL-EQA program for retinol and Vitamin B12. Zinc and MRDR are currently not part of the VITAL-EQA and EQUIP programs.

## Internal Quality Control

All laboratories that were involved in the analysis of the biological specimens routinely test quality control (QC) pools along with the specimen analysis. The most reliable internationally acknowledged quality control sera and urine are developed by National Institute of Standards and Technology (NIST) (for vitamin B12, urinary iodine, and zinc), whole blood (for RBC folate) and bench QC materials developed by the respective laboratories. Specimen results were documented in a tabulated format using EXCEL files.

The VitMin Lab analyzed the survey specimens for ferritin, sTfR, CRP, RBP and AGP using an ELISA technique. The lab routinely tested a single QC pool in 10 different wells randomly distributed in each 384-well plate. The inter-assay coefficients variation (CV) for these analytes were $4.6 \%$ for RBP, $3.5 \%$ for ferritin, $5.4 \%$ for sTfR, $4.9 \%$ for AGP, and $4.2 \%$ for CRP. A CV of about $10 \%$ provides acceptable precision using an ELISA technique (Erhardt, 2004; Haynes,
2008). These data indicate that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

The Peking University, Institute of Reproductive and Child Health laboratory analyzed the survey specimens for folate concentrations in RBC hemolysate using the microbiological assay. The lab routinely tested bench and blind QC materials distributed in each 96-well plate. Each run contained three levels (low, medium, and high) of bench QCs in four replicates each at the front and back of each run. Each run also contained one blind QC replicated in 22 wells throughout the plate. The inter-assay variation (CV) was $4.1 \%$ for folate. A CV of about $10 \%$ provides acceptable precision using the microbiological assay. These data indicate that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens. The inter-assay variation (CV) was $<10 \%$ for the microbiological assay indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

INCAP analyzed survey specimens for vitamin A (MRDR and retinol), serum vitamin B12, serum zinc, and urinary iodine. For serum vitamin B12, there were three levels of quality controls used by BioRad for the immunoassay. Also for serum zinc, INCAP used a BioRad serum control with three levels of control materials. Dilutions of each control level were prepared according to the manufacturer's protocol. In each analytical run, a duplicate sample was analyzed to test for repeatability of the assay. For both indicators, the laboratory routinely tested QC sera developed by NIST for all biological specimen runs. All NIST controls were acceptable in each run indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens. The inter-assay variation (CV) was $<10 \%$ for vitamin B12 and zinc indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens. For urinary iodine, INCAP used the gold standard titration assay with use of NIST quality control materials and bench prepared quality control controls daily. The inter-assay variation (CV) was $<10 \%$ for urinary iodine.

INCAP analyzed vitamin A (MRDR and retinol) in serum using HPLC. The laboratory routinely tested bench control materials distributed in each specimen plate. Each run contained three levels (low, medium, and high) of bench QCs each at the front and back of each run. Each specimen run was accepted based on the following criteria: $>50 \%$ internal standard recovery; sufficient peak separation between retinol and MRDR peaks; MRDR ratio between 0.01-0.07; MRDR ratio between below 0.05 when the retinol ratio is below $30 \mu \mathrm{~g} / \mathrm{dL}$; and MRDR ratio above 0.03 when the retinol ratio is above $30 \mu \mathrm{~g} / \mathrm{dL}$. The inter-assay variation (CV) was $<10 \%$ for MRDR and retinol indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

Samyak Diagnostic Pvt. Ltd Laboratory in Patan, Nepal analyzed blood specimens that were collected for blood disorders. The blood was first transported to the Nepal National Pubic Health Laboratory (NPHL) in Kathmandu, Nepal to have complete blood count (CBC) analyzed on each blood sample before being transferred to Samyak for blood disorder measurement. The NPHL analyzed the CBC using a Horbia ABX SAS automated hematology cell counter. The NPHL ran QC materials provided by the hematology manufacturer with each run using three levels (low, medium, and high) and printed the results for reporting. The inter-assay variation (CV) was $<10 \%$ for CBC indicating that the lab's performance exceeded the acceptable
performance expectations while analyzing the survey specimens. Samyak then received the specimens to be analyzed for blood disorders, including alpha thalassemia, beta thalassemia, sickle cell, hemoglobin E, and glucose-6-phosphate dehydrogenase deficiency (G6PD), using genetic testing kits. Each run contained three levels (low, medium, and high) of bench QCs each at the front and back of each run. The inter-assay variation (CV) was $<10 \%$ for each blood disorder indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

Siddhi Polyclinic Laboratory in Kathmandu, Nepal analyzed stool specimens collected from the survey for H. pylori using an ELISA test kit on a Mago clinical analyzer. The kit provides both positive and negative controls which are used with each analytical run. The laboratory obtained valid tests during each analytical run for the positive control where the absorbance was at least 0.8 OD units and the negative control was less than 0.09 OD units. In addition, the laboratory used their own bench QCs with each run using three levels (low, medium, and high). The inter-assay variation (CV) was <10 percent for each analytical run indicating that the lab’s performance exceeded the acceptable performance expectations while analyzing the survey specimens.

The Department of Food Technology and Quality Control (DFTQC) in Nepal analyzed salt and wheat flour specimens collected from the survey. Wheat flour specimens were analyzed using a combination of methods, including the dry-ashing and flame atomic absorption spectrophotometry (FAAS) method, due to difficulties in keeping equipment available and operational. However, both methods are comparable and were tested in comparison with one another during these analyses, thus the laboratory is confident in the results being produced. The wheat flour specimen analysis included QCs in each run contained in three levels (low, medium, and high). Each analytical run also included a standard assay curve and blanks. The inter-assay variation (CV) was $<10 \%$ for wheat flour indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens. Salt specimens were first analyzed using a qualitative test to indicate a positive or negative test. All positive samples and a subsample of negative samples were then selected for quantitative testing, which included the salt iodine titration method. The laboratory included known QC levels of iodized salt (low, medium, and high). The inter-assay variation (CV) was $<10 \%$ for salt indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

## Annex 10: Anthropometry Data Quality Assessment

The assessment of anthropometry data quality focused on length/height and weight measurements collected among children 6-59 months, adolescent boys and girls aged 10-19 years, and non-pregnant women 15-49 years. The data quality indicators used to assess the measurements include: 1) data completion: percent of missing data in age, sex, length/height, and weight; 2) biologically implausible values (BIV) of length/height-for-age z-score (LAZ/HAZ), weight-for-age z-score (WAZ), weight-for-length/height z-score (WLZ/WHZ), and body mass index (BMI)-for-age z-score (BMIZ); 3) digital preference to examine the heaping of length/height and weight measurements; and 4) standard deviation of z-scores.

There were no missing data for age, sex, length/height and weight in children 6-59 months, adolescent boys and girls aged 10-19 years, and non-pregnant women 15-49 years (data not shown). Everyone who consented to the interview completed the anthropometry measurements.

Annex 10.1: Percent of Biologically Implausible Value (BIV) of Length/Height-for-age z-score (LAZ/HAZ),Weight-for-age z-score (WAZ),Weight-for-length/height z-score (WLZ/WHZ), and Body Mass Index (BMI)-for-age z-score (BMIZ) in Children 6-59 Months and Adolescent Boys and Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Population Group | Characteristics | N | Biologically Implausible value (BIV) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | LAZ/HAZ, \% | WAZ, \% | WLZ/WHZ, \% | BMIZ, \% |
|  |  |  | \% | \% | \% | \% |
| Children, 6-59 months | Age, months |  |  |  |  |  |
|  | 6-11 | 160 | 1.3 | 0.6 | 1.3 | 1.9 |
|  | 12-23 | 347 | 1.2 | - | 0.9 | 1.4 |
|  | 24-35 | 391 | 0.8 | - | 0.3 | 0.3 |
|  | 36-47 | 416 | 1.0 | - | 0.5 | 1.7 |
|  | 48-59 | 388 | - | - | 0.3 | 0.3 |
|  | Sex |  |  |  |  |  |
|  | Male | 856 | 0.7 | 0.1 | 0.6 | 1.1 |
|  | Female | 846 | 0.8 | - | 0.5 | 0.9 |
|  | Total | 1,702 | 0.8 | 0.1 | 0.5 | 1.0 |
| Adolescent boys 10-19 years | Age, years |  |  |  |  |  |
|  | 10-14 | 601 | 0.3 | - | - | 0.5 |
|  |  | 384 | 0.5 | - | - | - |
|  | Total | 985 | 0.4 | - | - | 0.3 |
| Non-pregnant adolescent girls 10-19 years | Age, years |  |  |  |  |  |
|  | 10-14 | 995 | 0.2 | - | - | 0.2 |
|  |  | 727 | - | - | - | - |
|  | Total | 1,722 | 0.1 | - | - | 0.1 |
| Note: unweighted estimates |  |  |  |  |  |  |

Overall, percent of BIVs were $\leq 1 \%$ for children 6-59 months, adolescent boys and girls aged 10-19 years, and non-pregnant women 15-49 years.

Annex 10.2: Percent of Digit Preference in Length/Height in Children 6-59 Months, Adolescent Boys and Girls 10-19 Years, and Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Population Group | Characteristics | Digit preference for length/height values |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | n | 0, \% | 1, \% | 2, \% | 3, \% | 4, \% | 5, \% | 6, \% | 7, \% | 8, \% | 9, \% |
| Children, 6-59 months | Age, months |  |  |  |  |  |  |  |  |  |  |  |
|  | 6-11 | 160 | 18.8 | 4.4 | 13.8 | 6.3 | 8.8 | 18.8 | 10.6 | 6.3 | 6.3 | 6.3 |
|  | 12-23 | 347 | 17.3 | 7.8 | 11.2 | 10.7 | 7.5 | 18.7 | 8.6 | 6.1 | 7.2 | 4.9 |
|  | 24-35 | 391 | 14.1 | 10.0 | 11.0 | 7.9 | 9.7 | 18.7 | 9.7 | 8.4 | 6.1 | 4.3 |
|  | 36-47 | 416 | 12.3 | 8.2 | 13.0 | 8.2 | 6.7 | 15.6 | 11.3 | 11.1 | 9.1 | 4.6 |
|  | 48-59 | 388 | 14.4 | 9.3 | 13.1 | 9.3 | 5.7 | 12.6 | 11.1 | 9.8 | 6.7 | 8.0 |
|  | Sex |  |  |  |  |  |  |  |  |  |  |  |
|  | Male | 856 | 14.8 | 7.6 | 11.9 | 9.0 | 7.9 | 17.1 | 10.2 | 9.8 | 6.5 | 5.1 |
|  | Female | 846 | 14.8 | 9.2 | 12.6 | 8.4 | 7.1 | 16.1 | 10.4 | 7.6 | 7.9 | 5.9 |
|  | Total | 1,702 | 14.8 | 8.4 | 12.3 | 8.7 | 7.5 | 16.6 | 10.3 | 8.7 | 7.2 | 5.5 |
| Adolescent boys 10-19 years | Age, years |  |  |  |  |  |  |  |  |  |  |  |
|  | 10-14 | 601 | 13.8 | 7.3 | 9.8 | 13.0 | 8.7 | 12.8 | 11.5 | 8.0 | 8.0 | 7.2 |
|  | 15-19 | 424 | 14.6 | 5.9 | 10.6 | 8.7 | 10.6 | 15.8 | 9.4 | 9.9 | 6.8 | 7.5 |
|  | Total | 1,025 | 14.1 | 6.7 | 10.1 | 11.2 | 9.5 | 14.0 | 10.6 | 8.8 | 7.5 | 7.3 |
| Non-pregnant adolescent girls 10-19 years | Age, years |  |  |  |  |  |  |  |  |  |  |  |
|  | 10-14 | 997 | 13.0 | 9.5 | 11.2 | 8.3 | 8.9 | 15.7 | 11.4 | 7.9 | 7.4 | 6.4 |
|  | 15-19 | 853 | 12.3 | 10.0 | 12.5 | 9.5 | 7.7 | 14.1 | 10.0 | 8.9 | 8.4 | 6.6 |
|  | Total | 1,850 | 12.7 | 9.7 | 11.8 | 8.9 | 8.4 | 15.0 | 10.8 | 8.4 | 7.9 | 6.5 |
| Non-pregnant women 15-49 years | $\begin{array}{\|c} \text { Age, years } \\ 15-19 \\ 20-29 \\ 30-39 \\ 40-49 \end{array}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 233 | 13.7 | 8.6 | 14.6 | 9.9 | 9.4 | 14.2 | 5.6 | 8.6 | 7.3 | 8.2 |
|  |  | 861 | 12.0 | 5.9 | 14.4 | 8.8 | 8.7 | 14.4 | 7.4 | 11.7 | 9.5 | 7.1 |
|  |  | 670 | 10.7 | 8.4 | 13.6 | 7.9 | 7.9 | 15.7 | 11.5 | 7.9 | 8.4 | 8.1 |
|  |  | 375 | 12.5 | 8.5 | 8.8 | 12.0 | 8.3 | 14.9 | 10.4 | 10.7 | 8.5 | 5.3 |
|  | Total | 2,139 | 11.9 | 7.4 | 13.2 | 9.2 | 8.5 | 14.9 | 9.0 | 10.0 | 8.7 | 7.2 |
| Note: unweighted estimates |  |  |  |  |  |  |  |  |  |  |  |  |

Ideally, each digital should be around $10 \%$. However, from this data, there were still some rounding at 0 or 5 for all four population groups.

Annex 10.3: Percent of Digit Preference in Weight in Children 6-59 Months, Adolescent Boys and Girls 10-19 Years, and Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Population Group | Characteristics | Digit preference for length/height values |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | n | 0, \% | 1, \% | 2, \% | 3, \% | 4, \% | 5, \% | 6, \% | 7, \% | 8, \% | 9, \% |
| Children, 6-59 months | Age, months |  |  |  |  |  |  |  |  |  |  |  |
|  | 6-11 | 160 | 10.0 | 6.3 | 12.5 | 11.3 | 9.4 | 8.8 | 8.8 | 15.0 | 7.5 | 10.6 |
|  | 12-23 | 347 | 14.4 | 8.4 | 11.0 | 11.0 | 9.8 | 7.5 | 6.9 | 12.1 | 10.4 | 8.6 |
|  | 24-35 | 391 | 13.6 | 7.7 | 7.4 | 9.2 | 10.2 | 13.6 | 10.2 | 8.4 | 10.2 | 9.5 |
|  | 36-47 | 416 | 9.9 | 10.1 | 11.5 | 9.6 | 9.6 | 9.6 | 10.8 | 11.3 | 8.9 | 8.7 |
|  | 48-59 | 388 | 10.6 | 9.5 | 10.6 | 10.3 | 7.5 | 10.8 | 8.5 | 12.1 | 10.8 | 8.0 |
|  | Sex |  |  |  |  |  |  |  |  |  |  |  |
|  | Male | 856 | 12.7 | 7.9 | 9.6 | 9.0 | 9.1 | 9.6 | 9.5 | 11.1 | 11.2 | 9.2 |
|  | Female | 846 | 10.9 | 9.5 | 11.1 | 11.2 | 9.5 | 11.0 | 8.9 | 11.6 | 8.4 | 8.5 |
|  | Total | 1,702 | 11.8 | 8.7 | 10.3 | 10.1 | 9.3 | 10.3 | 9.2 | 11.6 | 9.8 | 8.9 |
| Adolescent boys 10-19 years | Age, years |  |  |  |  |  |  |  |  |  |  |  |
|  | 10-14 | 601 | 11.6 | 10.1 | 8.3 | 10.8 | 10.1 | 11.6 | 11.5 | 8.7 | 8.5 | 8.7 |
|  | 15-19 | 424 | 12.5 | 12.7 | 11.8 | 9.2 | 7.8 | 9.0 | 6.8 | 9.7 | 12.0 | 8.5 |
|  | Total | 1,025 | 12.0 | 11.2 | 9.8 | 10.1 | 9.2 | 10.5 | 9.6 | 9.1 | 10.0 | 8.6 |
| $\begin{aligned} & \text { Non-pregnant } \\ & \text { adolescent girls } \\ & 10-19 \text { years } \end{aligned}$ | Age, years |  |  |  |  |  |  |  |  |  |  |  |
|  | $10-14$ | 997 | 13.1 | 10.2 | 9.7 | 8.7 | 10.2 | 10.7 | 8.7 | 8.9 | 10.9 | 8.6 |
|  | 15-19 | 853 | 12.3 | 9.4 | 9.7 | 10.2 | 9.5 | 10.8 | 8.2 | 10.4 | 10.0 | 9.5 |
|  | Total | 1,850 | 12.8 | 9.8 | 9.7 | 9.4 | 9.9 | 10.8 | 8.5 | 9.6 | 10.5 | 9.0 |
| Non-pregnant women 15-49 years | Age, years |  |  |  |  |  |  |  |  |  |  |  |
|  | 15-19 | 233 | 12.4 | 8.5 | 8.1 | 8.0 | 9.4 | 12.8 | 8.5 | 10.7 | 9.4 | 9.4 |
|  | 20-29 | 861 | 13.4 | 11.4 | 8.2 | 11.0 | 8.0 | 11.9 | 9.3 | 10.1 | 9.0 | 10.6 |
|  | 30-39 | 670 | 10.1 | 11.6 | 7.0 | 9.6 | 10.4 | 8.2 | 10.0 | 12.1 | 11.0 | 8.5 |
|  | 40-49 | 375 | 14.7 | 10.2 | 10.2 | 9.5 | 9.4 | 9.6 | 7.5 | 11.5 | 10.7 | 6.7 |
|  | Total | 2,139 | 12.5 | 10.9 | 8.1 | 10.7 | 9.2 | 10.4 | 9.1 | 11.0 | 10.0 | 9.1 |

Note: unweighted estimates

Annex 10.4: Standard deviation (SD), Minimum (Min) and Maximum (Max) of Length/heightfor-age z-score (LAZ/HAZ),Weight -for-age z-score (WAZ),Weight -for-length/height z-score (WLZ/WHZ), and Body Mass Index (BMI)-for-age z-score (BMIZ) in Children 6-59 Months and Adolescent Boys and Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Population Group | Characteristics | n | LAZ/HAZ |  | WAZ |  | WLZ/WHZ |  | BMIZ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | SD | (Min, Max) | SD | (Min, Max) | SD | (Min, Max) | SD | (Min, Max) |
| Children, 659 months | Age, months |  |  |  |  |  |  |  |  |  |
|  | 6-11 | 158 | 1.3 | $(-4.8,2.7)$ | 1.4 | $(-5.6,2.2)$ | 1.2 | $(-4.7,2.3)$ | 1.2 | $(-4.7,2.2)$ |
|  | 12-23 | 343 | 1.5 | $(-5.0,5.7)$ | 1.2 | (-5.1,3.5) | 1.1 | (-4.4,3.3) | 1.1 | $(-3.9,3.8)$ |
|  | 24-35 | 389 | 1.3 | (-6.0,3.4) | 1.1 | $(-4.3,2.9)$ | 1.1 | $(-4.6,2.6)$ | 1.2 | $(-4.8,3.5)$ |
|  | $36-47$ | 412 | 1.4 | (-5.9,2.6) | 1.1 | $(-4.7,3.5)$ | 1.1 | $(-4.8,4.8)$ | 1.0 | $(-3.6,4.5)$ |
|  | 48-59 | 388 | 1.3 | (-5.9,4.3) | 1.1 | $(-4.8,1.6)$ | 1.0 | $(-4.5,3.6)$ | 1.0 | $(-4.3,3.4)$ |
|  | Sex |  |  |  |  |  |  |  |  |  |
|  | Male | 850 | 1.4 | (-5.9,5.0) | 1.1 | $(-4.8,3.5)$ | 1.1 | $(-4.6,4.8)$ | 1.1 | $(-4.8,4.5)$ |
|  | Female | 840 | 1.4 | (-6.0,5.7) | 1.2 | $(-5.6,3.0)$ | 1.1 | (-4.8,4.3) | 1.1 | (-4.7,4.4) |
|  | Total | 1,690 | 1.4 | (-6.0,5.7) | 1.2 | $(-5.6,3.5)$ | 1.1 | (-4.8,4.8) | 1.1 | (-4.8,4.5) |
| Adolescent boys 10-19 years | Age, years |  |  |  |  |  |  |  |  |  |
|  | $10-14$ | 598 | 1.2 | (-4.7,4.3) |  |  |  |  | 1.2 | (-4.8,4.2) |
|  | 15-19 | 384 | 0.9 | (-4.6,1.3) |  |  |  |  | 1.0 | $(-4.5,2.4)$ |
|  | Total | 982 | 1.1 | (-4.7,4.3) |  |  |  |  | 1.1 | (-4.8,4.2) |
| Nonpregnant adolescent girls 10-19 years | Age, years |  |  |  |  |  |  |  |  |  |
|  | $10-14$ | 995 | 1.1 | (-5.8,4.8) |  |  |  |  | 1.1 | (-4.6,3.2) |
|  |  | 727 | 0.8 | (-4.9,1.8) |  |  |  |  | 0.9 | (-3.4,4.0) |
|  | Total | 1,722 | 1.0 | (-5.8,4.8) |  |  |  |  | 1.1 | (-4.6,4.0) |

Note: unweighted estimates. Biologically Implausible value (BIV) are excluded.

Annex 10.5: Standard Deviation (SD), Minimum (Min) and Maximum (Max) of Body Mass Index (BMI) in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Population Group | Characteristics | BMI |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | n | SD | Min, Max |
| Non-pregnant women 15-49 years | Age, years |  |  |  |
|  | 15-19 | 233 | 2.9 | (14.2,43.3) |
|  | 20-29 | 861 | 3.4 | (14.4-44.8) |
|  | 30-39 | 670 | 4.0 | (14.3-39.3) |
|  | 40-49 | 375 | 4.3 | (15.0-36.9) |
|  | Total | 2,139 | 3.9 | (14.2-44.8) |
| Note: unweighted estimates |  |  |  |  |

Annex 10.6: Mean Body Mass Index-for-age z-score (BMIZ) and the Prevalence of Wasting,
Overweight and Obesity among Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Mean z-score (95\% CI) |  |  | Prevalence, \% (95\% CI) |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | $\begin{aligned} & \hline \text { <-2 z-score } \\ & \text { (Wasted) } \\ & \hline \end{aligned}$ |  |  | $<-3$ z-score(Severely wasted) |  |  | $>2 \text { z-score }$ <br> (Overweight) |  |  | >3 z-score (Obese) |  |  |
|  |  | $\begin{gathered} \text { Mean } \\ z- \\ \text { score } \end{gathered}$ | $\begin{gathered} \hline \text { SD } \\ \text { z- } \\ \text { score } \end{gathered}$ | CI z-score |  | (95\% CI) | p-value | \% | 95\%CI | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | \% | $\begin{gathered} \text { (95\% } \\ \text { CI) } \end{gathered}$ | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Development Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 332 | -0.52 | 1.71 | (-0.75,-0.29) | 11.4 | (7.6-16.7) |  | 0.4 | (0.1-1.5) |  | 1.6 | (0.6-4.2) |  | 1.3 | (0.4-4.1) |  |
| Central | 353 | -0.46 | 1.60 | $(-0.68,-0.25)$ | 7.5 | (4.9-11.3) |  | 2.6 | (1.7-4.2) |  | 3.2 | (1.3-7.6) |  | 1.2 | (0.5-2.7) |  |
| Western | 290 | -0.40 | 3.01 | (-0.73,-0.07) | 8.8 | (5.7-13.2) | 0.140 | 2.3 | (1.0-5.2) | 0.015 | 0.9 | (0.4-2.3) | 0.164 | 0.8 | (0.3-2.1) | 0.777 |
| Mid-western | 350 | -0.57 | 1.59 | (-0.71,-0.43) | 11.9 | (9.3-15.2) |  | 4.7 | (2.9-7.4) |  | 2.3 | (1.0-5.2) |  | 1.5 | (0.5-4.6) |  |
| Far-western | 376 | -0.61 | 1.20 | (-0.74,-0.49) | 7.4 | (5.4-10.1) |  | 2.6 | (1.6-4.0) |  | 1.2 | (0.5-3.0) |  | 0.5 | (0.1-1.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 273 | -0.48 | 1.13 | (-0.64,-0.31) | 6.1 | (4.8-7.7) |  | 1.9 | (0.6-5.2) |  | 1.0 | (0.4-2.7) |  | 0.3 | (0.2-0.3) |  |
| Hill | 706 | -0.41 | 1.23 | (-0.52,-0.31) | 7.5 | (6.1-9.2) | 0.025 | 2.0 | (1.5-2.7) | 0.472 | 2.4 | (1.1-5.0) | 0.491 | 0.8 | (0.6-1.1) | 0.271 |
| Terai | 722 | -0.57 | 2.40 | (-0.77,-0.36) | 11.1 | (8.4-14.4) |  | 2.7 | (1.8-4.2) |  | 2.1 | (0.9-4.7) |  | 1.4 | (0.7-3.1) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 226 | -0.16 | 1.99 | (-0.60,-0.28) | 2.3 | (1.0-5.1) | <0.001 | 0.6 | (0.1-3.0) | 0.046 | 4.0 | (1.1-13.2) | 0.030 |  | (0.2-8.1) | 0.711 |
| Rural | 1,475 | -0.55 | 1.89 | (-0.65,-0.44) | 10.2 | (8.5-12.2) |  | 2.6 | (2.0-3.6) |  | 1.9 | (1.1-3.2) |  | 1.1 | (0.7-1.7) |  |
| Age, months |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 | 159 | -0.63 | 1.40 | (-0.86,-0.40) | 11.3 | (7.2-17.3) |  | 3.8 | (1.7-8.5) |  | 1.4 | (0.2-9.5) |  | - | - |  |
| 12-23 | 347 | -0.55 | 2.79 | (-0.87,-0.23) | 11.5 | (8.3-15.7) |  | 2.7 | (1.6-4.5) |  | 3.5 | (1.5-7.9) |  | 0.6 | (0.1-2.1) |  |
| 24-35 | 391 | -0.45 | 1.69 | $(-0.65,-0.25)$ | 10.7 | (7.8-14.3) | 0.038 | 2.2 | (1.0-4.6) | 0.544 | 1.3 | (0.4-3.9) | 0.022 | 0.9 | (0.2-3.8) | 0.003 |
| 36-47 | 416 | -0.20 | 1.89 | (-0.46,-0.07) | 5.8 | (4.1-8.2) |  | 2.5 | (1.6-3.8) |  | 3.3 | (2.0-5.5) |  |  | (1.6-5.1) |  |
| 48-59 | 388 | -0.75 | 1.08 | (-0.91,-0.60) | 8.4 | (5.7-12.2) |  | 1.6 | (0.6-4.1) |  | 0.7 | (0.2-2.5) |  | 0.4 | (0.1-2.9) |  |
| Sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Male | 855 | -0.50 | 1.67 | (-0.65,-0.34) | 9.5 | (7.3-12.1) |  | 2.5 | (1.7-3.8) |  | 2.6 | (1.2-5.6) |  | 1.0 | (0.4-2.3) |  |
| Female | 846 | -0.49 | 2.16 | (-0.65,-0.33) | 8.9 | (7.2-11.0) | 0.664 | 2.2 | (1.5-3.3) | 0.730 | 1.6 | (0.9-2.7) | 0.159 | 1.3 | (0.7-2.3) | . 593 |
| Maternal Education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {a }}$ | 226 | -0.44 | 3.48 | (-0.88,-0.01) | 7.6 | (5.5-10.3) |  | 2.2 | (1.2-3.9) |  | 1.4 | (0.6-3.3) |  |  | (0.6-3.3) |  |
| Primary ${ }^{\text {b }}$ | 175 | -0.69 | 1.47 | (-0.93,-0.45) | 11.4 | (7.0-18.0) | 0329 | 5.0 | (2.2-10.8) | 0.043 | 3.1 | (2.2-4.4) | 0.496 | 1.5 | (1.0-2.1) | 0.982 |
| Some secondary ${ }^{\text {c }}$ | 241 | -0.33 | 1.84 | (-0.65,-0.00) | 7.9 | (4.7-12.8) |  | 1.5 | (0.9-2.5) |  | 1.3 | (0.3-5.6) |  |  | (0.2-5.9) |  |
| SLC and above ${ }^{\text {d }}$ | 230 | -0.39 | 1.99 | (-0.79,-0.01) | 6.2 | (3.2-11.9) |  | 0.8 | (0.2-3.6) |  | 2.4 | (0.6-8.5) |  | 1.5 | (0.3-8.2) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 472 | -0.37 | 2.93 | (-0.66,-0.09) | 12.3 | (10.0-15.2) |  | 3.7 | (2.4-5.6) |  | 3.6 | (2.6-4.8) |  |  | (1.7-3.5) |  |
| Second | 351 | -0.54 | 1.14 | (-0.66,-0.41) | 8.4 | (5.5-12.7) |  | 2.6 | (1.4-4.8) |  | 0.4 | (0.1-1.9) |  | 0.3 | (0.0-2.2) |  |
| Middle | 301 | -0.72 | 1.20 | (-0.88,-0.56) | 9.5 | (5.7-15.4) | 0.149 | 1.8 | (0.7-4.3) | 0.329 | 0.2 | (0.1-0.7) | 0.001 | 0.2 | (0.1-0.7) | 0.035 |
| Fourth | 317 | -0.53 | 1.81 | $(-0.77,-0.30)$ | 8.6 | (6.0-12.3) |  | 2.2 | (1.3-3.8) |  | 2.6 | (1.1-6.0) |  | 1.4 | (0.4-4.5) |  |
| Highest | 260 | -0.32 | 1.75 | $(-0.68,-0.04)$ | 6.7 | (3.8-11.5) |  | 1.4 | (0.4-4.6) |  | 3.6 | (1.1-11.2) |  | 1.0 | (0.1-6.2) |  |
| Total | 1,701 | -0.50 | 1.91 | (-0.61,-0.38) | 9.2 | (7.6-11.0) |  | 2.4 | (1.8-3.1) |  | 2.1 | (1.2-3.6) |  | 1.1 | (0.7-1.8) |  |
| Note: N unweighted All estimates account for weighting and complex sample design. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| z-scores are calculated using 2006 WHO growth standards. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CI-Confidence Interval |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have never attended school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'Includes those who have completed 6-9 years of school.SIncludes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Annex 11: Additional Tables of Micronutrient Status

Annex 11.1: Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Children 6-59 Months, Not Adjusted for Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\begin{array}{\|c} \hline \text { Ferritin } \mu \mathrm{g} / \mathrm{L}^{\mathrm{a}} \\ \text { (Geometric Mean } \pm \text { SD) } \end{array}$ |  | $\begin{gathered} \text { Iron deficiency } \\ \text { Ferritin }<12.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{~b}} \end{gathered}$ |  |  | Iron deficiency anemia Hemoglobin $<11.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{c}}$ and Ferritin $<12.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 323 | 26.1 | 2.3 | 18.7 | (13.4-25.6) |  | 7.3 | (4.1-12.6) |  |
| Central | 346 | 22.0 | 2.4 | 24.6 | (20.5-29.3) |  | 10.9 | (7.1-16.6) |  |
| Western | 277 | 21.1 | 2.2 | 23.0 | (17.7-29.5) | 0.277 | 8.7 | (5.9-12.6) | 0.409 |
| Mid-western | 339 | 23.1 | 2.3 | 22.8 | (18.5-27.8) |  | 8.3 | (5.5-12.4) |  |
| Far-western | 366 | 23.2 | 2.3 | 20.5 | (15.5-26.6) |  | 9.3 | (5.7-14.7) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 268 | 26.5 | 2.4 | 20.5 | (14.7-27.8) |  | 9.0 | (4.8-16.3) |  |
| Hill | 685 | 25.0 | 2.2 | 17.0 | (14.8-19.4) | <0.001 | 7.3 | (5.6-9.4) | 0.060 |
| Terai | 698 | 20.9 | 2.4 | 27.2 | (23.0-31.8) |  | 10.8 | (7.6-15.3) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 211 | 19.5 | 2.4 | 31.2 | (21.6-42.8) | 0.001 | 16.2 | (9.2-27.1) | <0.001 |
| Rural | 1,440 | 23.5 | 2.3 | 21.1 | (18.4-24.1) | 0.001 | 8.2 | (6.3-10.7) | <0.001 |
| Age, months |  |  |  |  |  |  |  |  |  |
| 6-8 | 65 | 22.1 | 2.6 | 28.7 | (18.1-42.3) |  | 17.2 | (10.2-27.6) |  |
| 9-11 | 84 | 17.0 | 2.4 | 36.4 | (26.6-47.6) |  | 24.2 | (16.6-33.8) |  |
| 12-17 | 171 | 15.2 | 2.2 | 38.1 | (31.8-44.9) |  | 21.9 | (14.9-30.9) |  |
| 18-23 | 157 | 14.5 | 2.5 | 43.4 | (36.4-50.6) | $<0.001$ | 16.7 | (12.1-22.7) | $<0.001$ |
| 24-35 | 384 | 22.5 | 2.4 | 21.7 | (17.3-26.8) |  | 6.7 | (4.4-10.3) |  |
| 36-47 | 403 | 27.5 | 2.2 | 14.5 | (10.3-20.1) |  | 5.4 | (2.4-11.7) |  |
| 48-59 | 387 | 30.5 | 2.0 | 11.1 | (7.9-15.2) |  | 2.2 | (0.9-5.1) |  |
| 6-23 | 477 | 16.0 | 2.4 | 38.3 | (34.2-42.7) | 001 | 19.9 | (16.1-24.3) | 0.0 |
| 24-59 | 1,174 | 26.7 | 2.2 | 15.6 | (13.1-18.5) | , | 4.7 | (3.0-7.3) | 0.00 |
| Sex |  |  |  |  |  |  |  |  |  |
| Male | 838 | 22.6 | 2.4 | 22.8 | (19.8-26.1) | 694 | 9.1 | (6.9-11.8) | . 79 |
| Female | 813 | 23.3 | 2.3 | 21.9 | (18.7-25.6) |  | 9.4 | (7.3-12.1) | . 79 |
| Maternal Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 222 | 21.7 | 2.3 | 24.6 | (16.6-34.8) |  | 10.1 | (4.8-19.9) |  |
| Primary ${ }^{\text {e }}$ | 170 | 24.5 | 2.5 | 20.0 | (14.0-27.6) | 0.456 | 8.6 | (5.4-13.5) | 0.339 |
| Some secondary ${ }^{\text {f }}$ | 238 | 25.5 | 2.2 | 18.3 | (14.1-23.4) | 0.456 | 7.3 | (4.0-13.1) | 0.339 |
| SLC and above ${ }^{\text {g }}$ | 220 | 21.1 | 2.3 | 21.3 | (15.8-28.2) |  | 11.9 | (7.8-17.7) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 462 | 26.4 | 2.3 | 17.8 | (13.8-22.8) |  | 8.9 | (6.0-12.9) |  |
| Second | 342 | 24.9 | 2.3 | 18.8 | (14.5-24.0) |  | 7.1 | (3.7-13.0) |  |
| Middle | 292 | 19.5 | 2.4 | 28.5 | (22.0-36.0) | 0.002 | 12.0 | (8.4-17.0) | 0.008 |
| Fourth | 304 | 23.7 | 2.3 | 21.1 | (15.9-27.6) |  | 5.8 | (3.7-9.0) |  |
| Highest | 251 | 20.5 | 2.3 | 26.4 | (19.8-34.2) |  | 12.6 | (8.0-19.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 149 | 19.2 | 2.3 | 30.4 | (22.2-40.0) |  | 6.0 | (3.6-10.0) |  |
| Hill Chhetri | 388 | 22.5 | 2.1 | 19.5 | (15.5-24.3) |  | 7.0 | (4.7-10.4) |  |
| Terai Brahmin/Chhetri | 42 | (20.4) | (2.2) | (29.7) | (11.4-58.1) |  | (6.4) | (1.5-23.7) |  |
| Other Terai caste | 131 | 17.5 | 2.4 | 33.0 | (25.0-42.2) |  | 18.9 | (9.9-33.0) |  |
| Hill Dalit | 263 | 24.1 | 2.3 | 18.6 | (13.7-24.7) | $<0.001$ | 8.3 | (5.4-12.5) | <0.001 |
| Terai Dalit | 85 | 22.9 | 2.6 | 26.8 | (20.1-34.8) | <0.001 | 9.6 | (4.3-20.2) | <0.001 |
| Newar | 50 | 27.3 | 2.4 | 16.2 | (8.3-29.2) |  | 7.9 | (2.3-24.0) |  |
| Hill Janajati | 375 | 29.8 | 2.2 | 13.3 | (10.0-17.5) |  | 5.2 | (3.7-7.2) |  |
| Terai Janajati | 117 | 27.6 | 2.2 | 12.5 | (7.2-20.8) |  | 5.7 | (2.5-12.6) |  |
| Muslim | 49 | (13.6) | 2.4 | (50.6) | (39.3-61.8) |  | (27.0) | (13.0-47.9) |  |
|  |  |  |  |  |  |  |  |  |  |
| Yes | 35 | (30.4) | (2.2) | (14.0) | (9.7-19.7) | 0 | (2.6) | (0.6-10.1) | . 18 |
| No | 1,616 | 22.8 | 2.3 | 22.6 | (20.1-25.3) | 0.245 | 9.4 | (7.4-11.8) | 0.187 |
| Total | 1,651 | 22.9 | 2.3 | 22.4 | (20.0-25.0) |  | 9.2 | (7.3-11.6) |  |

[^68]Annex 11.2: Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Adolescent Boys 10-19 Years, Not Adjusted for Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\mathrm{a}}$ |  | $\begin{aligned} & \text { Iron deficiency } \\ & \text { Ferritin } \\ & <15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{~b}} \end{aligned}$ |  |  | Iron deficiency anemia Hemoglobin Children 5-11 y $<11.5 \mathrm{~g} / \mathrm{dL}$, Children 12-14 y $<12.0 \mathrm{~g} / \mathrm{dL}$ and Men $\geq 15 \mathrm{y}<13.0$ $\mathrm{g} / \mathrm{dL}^{\mathrm{d}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 207 | 54.1 | 1.7 | 1.1 | (0.3-3.5) |  | 0.2 | (0.0-1.8) |  |
| Central | 206 | 46.0 | 2.0 | 7.0 | (4.9-9.9) |  | 0.8 | (0.1-5.4) |  |
| Western | 193 | 41.8 | 1.8 | 6.9 | (4.2-11.0) | 0.003 | 1.5 | (0.4-6.2) | 0.791 |
| Mid-western | 196 | 51.0 | 1.8 | 3.0 | (1.2-7.5) |  | 1.6 | (0.4-6.6) |  |
| Far-western | 210 | 48.2 | 1.7 | 2.0 | (0.7-5.4) |  | 0.6 | (0.1-4.2) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 154 | 48.0 | 1.7 | 1.6 | (0.4-6.8) |  | 0.0 | - |  |
| Hill | 430 | 45.4 | 1.8 | 5.2 | (3.9-6.8) | 0.370 | 0.9 | (0.2-3.0) | 0.718 |
| Terai | 428 | 49.6 | 1.9 | 4.5 | (2.9-6.8) |  | 1.0 | (0.3-3.2) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 140 | 52.7 | 1.8 | 3.0 | (1.6-5.8) | 0.304 | 0.0 | - |  |
| Rural | 872 | 47.0 | 1.9 | 4.8 | (3.6-6.4) | 0.304 | 1.0 | (0.4-2.4) |  |
| Age, years |  |  |  |  |  |  |  |  |  |
| 10-11 | 202 | 43.5 | 1.9 | 8.2 | (5.4-12.2) |  | 0.9 | (0.1-6.0) |  |
| 12-13 | 263 | 43.0 | 1.9 | 4.6 | (2.0-10.2) |  | 1.5 | (0.4-6.4) |  |
| 14-15 | 234 | 43.0 | 1.7 | 4.7 | (2.6-8.4) | 0.016 | 1.2 | (0.3-4.6) | 0.537 |
| 16-17 | 165 | 48.6 | 1.8 | 3.5 | (1.5-8.1) |  | 0.4 | (0.1-2.9) |  |
| 18-19 | 148 | 70.9 | 1.7 | 0.7 | (0.1-5.2) |  | 0.0 | - |  |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 7 | * | * | * | * |  | * | * |  |
| Primary ${ }^{\text {e }}$ | 318 | 44.3 | 1.9 | 6.7 | (4.7-9.6) | 0.009 | 2.2 | (0.8-5.7) | 0.013 |
| Some secondary ${ }^{\text {f }}$ | 544 | 47.2 | 1.8 | 4.2 | (2.3-7.6) | 0.009 | 0.4 | (0.1-1.5) | 0.013 |
| SLC and above ${ }^{\text {g }}$ | 143 | 59.7 | 1.7 | 0.6 | (0.1-4.3) |  | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 248 | 46.2 | 1.8 | 4.5 | (3.1-6.4) |  | 0.0 | - |  |
| Second | 206 | 39.9 | 1.8 | 6.4 | (4.1-9.8) |  | 0.3 | (0.0-2.3) |  |
| Middle | 209 | 51.1 | 1.8 | 4.5 | (1.9-10.2) | 0.666 | 2.0 | (0.5-6.7) | 0.386 |
| Fourth | 163 | 54.2 | 1.8 | 3.4 | (1.5-7.6) |  | 1.2 | (0.3-5.1) |  |
| Highest | 186 | 48.6 | 1.9 | 3.9 | (2.0-7.2) |  | 0.8 | (0.1-5.5) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 135 | 36.6 | 1.8 | 6.3 | (2.5-14.8) |  | 1.5 | (0.2-9.2) |  |
| Hill Chhetri | 266 | 44.3 | 1.7 | 2.4 | (1.3-4.7) |  | 0.6 | (0.1-4.2) |  |
| Terai Brahmin/Chhetri | 31 | (58.8) | (1.9) | 2.9 | (0.6-13.6) |  | (0.0) | - |  |
| Other Terai caste | 70 | 46.9 | 2.0 | 9.8 | (5.0-18.3) |  | 2.0 | (0.3-11.3) |  |
| Hill Dalit | 116 | 45.7 | 1.9 | 7.7 | (5.3-10.9) | 0.013 | 0.7 | (0.1-5.3) | 0.438 |
| Terai Dalit | 38 | (55.5) | (1.8) | (0.0) | - | 0.013 | (0.0) | - | 0.438 |
| Newar | 37 | (61.3) | (1.7) | (0.0) | (2.3-7.2) |  | (0.0) | - |  |
| Hill Janajati | 209 | 50.3 | 1.8 | 4.1 | (2.3-7.2) |  | 0.0 | - |  |
| Terai Janajati | 88 | 58.5 | 1.8 | 4.2 | (1.1-14.9) |  | 1.4 | (0.3-5.8) |  |
| Muslim | 22 | * | * | * | * |  | * | * |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 13 | * | * | * | * |  | * | * |  |
| No | 999 | 47.7 | 1.8 | 4.6 | (3.6-5.9) |  | 0.9 | (0.4-2.1) |  |
| Total | 1,012 | 47.7 | 1.8 | 4.6 | (3.5-5.9) |  | 0.9 | (0.4-2.1) |  |

[^69]Annex 11.3: Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Non-Pregnant Adolescent Girls 10-19 Years, Not Adjusted for Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\text {a }}$ |  | Iron deficiency Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  | Iron deficiency anemia Hemoglobin Children 5-11 y <11.5 g/dL, Children $12-14 \mathrm{y}<12.0 \mathrm{~g} / \mathrm{dL}$ and Women $15-49 \mathrm{y}$ $<12.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{C}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |
| Eastern | 351 | 33.1 | 2.0 | 13.0 (8.4-19.6) |  | 7.7 | (3.8-15.2) |  |
| Central | 352 | 28.4 | 2.1 | 19.5 (14.9-25.1) |  | 7.0 | (4.4-10.9) |  |
| Western | 347 | 28.9 | 2.1 | 18.8 (14.5-24.1) | 0.023 | 6.4 | (4.0-10.0) | 0.849 |
| Mid-western | 379 | 33.0 | 2.1 | 13.0 (10.2-16.5) |  | 5.6 | (3.7-8.4) |  |
| Far-western | 411 | 30.4 | 2.1 | 18.2 (13.0-24.8) |  | 7.1 | (4.5-11.0) |  |
| Ecological Region |  |  |  |  |  |  |  |  |
| Mountain | 288 | 30.1 | 2.1 | 18.5 (12.0-27.3) |  | 4.7 | (2.2-9.6) |  |
| Hill | 774 | 30.1 | 2.1 | 16.8 (14.1-19.9) | 0.885 | 5.0 | (3.8-6.5) | 0.003 |
| Terai | 778 | 30.6 | 2.1 | 16.7 (13.0-21.1) |  | 8.9 | (6.0-12.9) |  |
| Location |  |  |  |  |  |  |  |  |
| Urban | 212 | 27.9 | 2.0 | 14.9 (8.9-23.8) |  | 6.6 | (3.3-12.7) |  |
| Rural | 1,628 | 30.6 | 2.1 | 17.1 (14.7-19.7) | 0.486 | 6.9 | (5.2-9.0) | 0.842 |
| Age, years |  |  |  |  |  |  |  |  |
| 10-11 | 341 | 36.0 | 1.8 | 7.3 (5.3-10.1) |  | 1.7 | (0.6-4.6) |  |
| 12-13 | 445 | 33.9 | 1.9 | 13.5 (9.7-18.5) |  | 3.2 | (1.7-5.7) |  |
| 14-15 | 402 | 28.1 | 2.2 | 20.2 (15.6-25.6) | $<0.001$ | 9.4 | (6.1-15.2) | $<0.001$ |
| 16-17 | 319 | 25.9 | 2.2 | 23.0 (19.1-27.6) |  | 11.1 | (8.2-14.8) |  |
| 18-19 | 333 | 28.0 | 2.2 | 21.2 (16.5-26.9) |  | 10.0 | (6.6-14.9) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |
| Yes | 78 | 30.0 | 2.0 | 15.8 (8.0-28.9) |  | 7.5 | (2.6-19.5) |  |
| No | 6 | * | * | * | - | * | * |  |
| Education |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 54 | 26.6 | 2.2 | 24.0 (13.3-39.6) |  | 12.5 | (6.9-21.5) |  |
| Primary ${ }^{\text {e }}$ | 536 | 35.5 | 1.9 | 11.1 (8.6-14.3) | <0.001 | 3.9 | $(2.1-7.1)$ |  |
| Some secondary ${ }^{\text {f }}$ | 990 | 29.2 | 2.1 | 17.5 (14.7-20.8) | <0.001 | 7.5 | (5.6-9.8) | 0.004 |
| SLC and above ${ }^{\text {g }}$ | 259 | 26.6 | 2.3 | 23.0 (17.9-29.2) |  | 8.0 | (5.1-12.5) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |
| Lowest | 490 | 32.5 | 2.1 | 14.5 (12.0-17.5) |  | 6.7 | (4.9-9.1) |  |
| Second | 424 | 29.2 | 2.1 | 18.9 (15.2-23.2) |  | 6.8 | (4.5-10.6) |  |
| Middle | 335 | 31.1 | 2.0 | 16.8 (12.1-22.7) | 0.029 | 6.5 | (4.1-10.1) | 0.099 |
| Fourth | 320 | 32.2 | 2.0 | 13.4 (9.4-18.6) |  | 4.5 | (2.4-8.3) |  |
| Highest | 271 | 26.3 | 2.1 | 21.6 (15.7-29.0) |  | 10.3 | (6.5-15.8) |  |
| Ethnicity |  |  |  |  |  |  |  |  |
| Hill Brahmin | 218 | 27.7 | 2.0 | 19.7 (14.1-26.7) |  | 6.4 | (3.3-11.8) |  |
| Hill Chhetri | 440 | 29.4 | 2.0 | 16.5 (13.4-20.1) |  | 6.4 | (4.4-9.2) |  |
| Terai Brahmin/Chhetri | 43 | (34.9) | (1.8) | (6.7) (1.7-23.0) |  | (2.3) | (0.3-16.7) |  |
| Other Terai caste | 124 | 30.9 | 1.9 | 15.0 (8.7-24.5) |  | 5.4 | (2.2-12.6) |  |
| Hill Dalit | 231 | 28.8 | 2.1 | 18.0 (12.8-24.6) | 0.629 | 5.3 | (3.1-8.9) | 0.024 |
| Terai Dalit | 90 | 33.1 | 2.1 | 15.1 (8.0-26.6) | 0.629 | 5.7 | (3.5-12.5) | 0.024 |
| Newar | 58 | 29.7 | 2.5 | 18.0 (7.9-35.8) |  | 4.5 | (1.1-16.5) |  |
| Hill Janajati | 414 | 31.4 | 2.1 | 26.6 (14.4-19.0) |  | 6.6 | (4.9-8.9) |  |
| Terai Janajati | 185 | 30.7 | 2.2 | 19.8 (14.0-27.2) |  | 14.1 | (8.6-22.2) |  |
| Muslim | 37 | (30.1) | (2.3) | (18.2) (9.3-32.8) |  | (12.0) | (4.5-28.7) |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |
| Yes | 38 | (32.2) | (2.2) | (18.4) (7.4-39.1) |  | (12.7) | (4.0-33.9) |  |
| No | 1,802 | 30.3 | 2.1 | 16.8 (14.5-19.4) | 0.855 | 6.7 | (5.1-8.8) | 0.134 |
| Total | 1,840 | 30.3 | 2.1 | 16.9 (14.6-19.4) |  | 6.8 | (5.3-8.8) |  |

[^70]Annex 11.4: Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Non-Pregnant Women 15-49 Years, Not Adjusted for Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\boldsymbol{\mu g} / \mathbf{L}^{\text {a }}$ |  | Iron deficiency Ferritin $<\mathbf{1 5 . 0} \boldsymbol{\mu g} / \mathbf{L}^{\mathrm{a}, \mathrm{b}}$ |  |  | Iron deficiency anemia Hemoglobin $<12.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{c}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 424 | 39.1 | 2.2 | 12.6 | (10.0-15.9) |  | 6.1 | (4.2-8.8) |  |
| Central | 428 | 33.7 | 2.2 | 16.2 | (13.7-19.0) |  | 7.3 | (4.4-12.0) |  |
| Western | 425 | 30.1 | 2.2 | 17.8 | (14.8-21.4) | 0.203 | 8.4 | (5.7-12.2) | 0.741 |
| Mid-western | 425 | 37.6 | 2.2 | 13.0 | (10.0-16.9) |  | 6.4 | (4.7-8.7) |  |
| Far-western | 427 | 32.8 | 2.1 | 15.2 | (11.4-19.9) |  | 6.4 | (3.8-10.4) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 355 | 34.9 | 2.2 | 15.0 | (11.0-20.0) |  | 4.1 | (2.2-7.6) |  |
| Hill | 895 | 34.5 | 2.2 | 15.5 | (13.5-17.6) | 0.962 | 5.4 | (3.9-7.4) | 0.006 |
| Terai | 879 | 34.4 | 2.2 | 15.0 | (12.9-17.4) |  | 8.8 | (6.5-12.0) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 292 | 32.5 | 2.3 | 16.9 | (12.6-22.3) | 0.411 | 8.0 | (5.1-12.2) | 0.540 |
| Rural | 1,837 | 34.8 | 2.2 | 14.9 | (13.3-16.7) | 0.411 | 6.9 | (5.3-8.9) | 0.540 |
| Age, years |  |  |  |  |  |  |  |  |  |
| 15-19 | 232 | 27.7 | 2.2 | 21.1 | (15.7-27.6) |  | 9.6 | (5.9-15.4) |  |
| 20-29 | 855 | 33.8 | 2.1 | 14.4 | (12.2-17.0) | 0.087 | 6.0 | (4.4-8.2) | 0.197 |
| 30-39 | 669 | 35.3 | 2.2 | 14.5 | (11.3-18.5) | 0.087 | 6.8 | (4.5-10.2) | 0.197 |
| 40-49 | 373 | 39.0 | 2.2 | 15.1 | (11.3-19.9) |  | 8.5 | (6.0-11.8) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |
| Yes | 590 | 34.9 | 2.1 | 10.9 | (8.1-14.5) | 0.007 | 5.6 | (3.6-8.7) | 0.030 |
| No | 233 | 34.0 | 2.3 | 18.0 | (14.0-22.8) | 0.007 | 10.1 | (6.6-15.2) | 0.030 |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 707 | 39.0 | 2.2 | 12.4 | (9.9-15.3) |  | 6.4 | (4.5-8.9) |  |
| Primary ${ }^{\text {e }}$ | 358 | 37.4 | 2.2 | 12.9 | (9.6-17.1) | 0.003 | 8.1 | (5.3-12.0) | 0.039 |
| Some secondary ${ }^{\text {f }}$ | 550 | 33.0 | 2.2 | 15.7 | (13.4-18.3) | 0.003 | 5.1 | (3.4-7.6) | 0.039 |
| SLC and above ${ }^{\text {g }}$ | 514 | 29.5 | 2.2 | 19.6 | (16.3-23.2) |  | 9.2 | (6.4-13.1) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 479 | 35.6 | 2.2 | 13.7 | (10.6-17.6) |  | 5.5 | (3.8-8.0) |  |
| Second | 447 | 36.2 | 2.1 | 13.5 | (11.0-16.4) |  | 7.4 | (5.3-10.4) |  |
| Middle | 413 | 35.8 | 2.2 | 14.8 | (11.5-18.9) | 0.229 | 7.5 | (4.7-11.7) | 0.244 |
| Fourth | 396 | 34.5 | 2.1 | 14.5 | (11.1-18.7) |  | 5.4 | (3.2-9.1) |  |
| Highest | 394 | 31.6 | 2.3 | 18.2 | (15.2-21.8) |  | 8.6 | (5.5-13.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 281 | 28.3 | 2.1 | 18.8 | (14.3-24.4) |  | 6.3 | (3.9-9.8) |  |
| Hill Chhetri | 508 | 33.7 | 2.1 | 15.0 | (12.2-18.3) |  | 6.9 | (4.5-10.5) |  |
| Terai Brahmin/Chhetri | 60 | 31.8 | 2.3 | 17.8 | (9.3-31.4) |  | 12.1 | (5.2-25.9) |  |
| Other Terai caste | 128 | 29.2 | 2.1 | 19.1 | (14.9-24.1) |  | 8.2 | (4.3-15.3) |  |
| Hill Dalit | 263 | 37.3 | 2.3 | 14.0 | (10.5-18.4) | 83 | 6.4 | (4.1-9.9) | 0.100 |
| Terai Dalit | 90 | 36.1 | 2.1 | 16.1 | (8.5-28.4) | 通 | 12.2 | (6.5-21.7) | 0.100 |
| Newar | 72 | 37.3 | 2.5 | 15.7 | (10.4-23.2) |  | 6.2 | (2.2-16.1) |  |
| Hill Janajati | 491 | 38.6 | 2.2 | 12.2 | (9.4-15.6) |  | 4.3 | (2.4-7.7) |  |
| Terai Janajati | 197 | 40.0 | 2.1 | 11.7 | (7.6-17.7) |  | 8.7 | (5.0-14.8) |  |
| Muslim | 37 | (35.8) | (2.3) | (16.5) | (5.7-39.2) |  | (8.1) | (2.1-26.5) |  |
| Iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 87 | 34.2 | 2.2 | 14.3 | (6.9-27.3) |  | 3.6 | (0.9-12.8) | 155 |
| No | 2,042 | 34.5 | 2.2 | 15.2 | (13.7-16.9) | 1 | 7.2 | (5.7-9.0) | , 155 |
| Total | 2,129 | 34.5 | 2.2 | 15.2 | (13.8-16.7) |  | 7.1 | (5.6-8.8) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
Sample size might vary slightly due to missing data.
Ferritin was not normally distributed and is reported as a geometric mean.
P-value obtained from Pearson's chi-square test.
aELISA; Erhardt et al 2004.
${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001.
${ }^{\text {chHemoglobin concentrations adjusted for altitude and smoking. WHO } 2011 .}$
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
${ }^{\mathrm{f}}$ Includes those who have completed 6-9 years of school.
sIncludes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Annex 11.5: Geometric Mean Ferritin, Iron Deficiency, and Iron Deficiency Anemia Prevalence in Pregnant Women 15-49 Years, Not Adjusted for Inflammation, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Ferritin $\mu \mathrm{g} / \mathrm{L}^{\text {a }}$ |  | Iron deficiency <br> Ferritin $<\mathbf{1 5 . 0} \boldsymbol{\mu g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  | Iron deficiency anemia Hemoglobin $<11.0 \mathrm{~g} / \mathrm{dL}^{\mathrm{c}}$ and Ferritin $<15.0 \mu \mathrm{~g} / \mathrm{L}^{\mathrm{a}, \mathrm{b}}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |  | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 43 | (35.7) | (1.9) | (12.0) | (4.2-29.8) |  |  | (2.4-25.0) |  |
| Central | 44 | (32.4) | (2.1) | (9.9) | (5.6-17.0) |  |  | (1.8-3.2) |  |
| Western | 36 | (34.7) | (1.9) | (7.5) | (1.6-28.5) | 0.971 |  | (0.3-16.1) | 0.546 |
| Mid-western | 42 | (36.9) | (1.9) | (8.7) | (3.8-18.7) |  |  | (0.4-19.6) |  |
| Far-western | 36 | (32.6) | (1.7) | (5.8) | (2.7-12.1) |  | (0.0) | - |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 21 | * | * | * | * |  | 8 | * |  |
| Hill | 86 | 36.6 | 2.0 | 6.1 | (3.8-9.5) | 0.216 | 1.9 | (0.5-7.1) | 0.335 |
| Terai | 94 | 32.7 | 1.9 | 11.8 | (6.2-21.3) |  |  | (2.2-12.6) |  |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 25 | (39.1) | (1.6) | (0.0) | - | 0.128 | (0.0) | - |  |
| Rural | 176 | 33.7 | 2.0 | 10.7 | (6.9-16.2) | 0.128 | 4.2 | (2.0-8.5) | 0.339 |
| Age, years |  |  |  |  |  |  |  |  |  |
| 15-19 | 37 | (35.4) | (1.6) | (2.0) | (0.3-12.7) |  | (2.0) | (0.3-12.7) |  |
| 20-29 | 138 | 35.0 | 2.0 | 9.8 | (6.3-15.0) | 0.168 | 2.6 | (0.9-6.9) | 0.930 |
| 30-49 | 23 | * | * | * | * |  | 8 |  |  |
| Trimester of Pregnancy(among pregnant women) |  |  |  |  |  |  |  |  |  |
| First trimester | 56 | 42.3 | 1.9 | 3.1 | (1.0-9.3) |  | 0.0 | - |  |
| Second trimester | 73 | 37.1 | 1.9 | 9.8 | (3.9-22.5) | 0.162 |  | (0.7-14.3) | 0.155 |
| Third trimester | 72 | 27.0 | 1.9 | 14.1 | (8.6-22.3) |  |  | (3.2-14.6) |  |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 43 | (29.5) | (1.9) | (11.5) | (4.8-25.0) |  | (6.8) | (3.5-13.0) |  |
| Primary ${ }^{\text {e }}$ | 40 | (37.6) | (2.1) | (6.9) | (2.6-16.9) | 0.611 |  | (0.2-11.3) | 0.370 |
| Some secondary ${ }^{\text {f }}$ | 60 | 34.9 | 2.0 | 7.4 | (4.7-11.4) |  |  | (0.2-8.7) |  |
| SLC and above ${ }^{\text {g }}$ | 58 | 34.3 | 1.8 | 12.5 | (5.2-27.3) |  | 5.8 | (1.4-20.6) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 47 | (35.0) | (1.9 | (9.2) | (3.8-20.6) |  | (4.8) | (1.1-18.2) |  |
| Second | 40 | (40.5) | (1.9 | (4.0) | (1.5-10.3) |  |  | (0.3-11.8) |  |
| Middle | 37 | (31.5) | (2.0 | (8.8) | (2.8-24.5) | 0.717 |  | (2.7-7.0) | 0.873 |
| Fourth | 53 | 32.1 | 2.0 | 12.6 | (5.8-24.9) |  | 3.0 | (0.4-19.6) |  |
| Highest | 24 | * | * | * | * |  | * | * |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 60 | 33.1 | 1.8 | 10.9 | (4.2-25.1) | 0.743 |  | (1.0-17.3) | 0.575 |
| No | 141 | 34.6 | 2.0 | 9.1 | (5.2-15.4) | 仡 | 3.6 | (1.5-8.1) | 0.575 |
| Total | 201 | 34.2 | 1.9 | 9.6 | (6.1-14.8) |  | 3.8 | (1.8-7.8) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
Sample size for pregnant women designed to be only nationally representative.
Ferritin was not normally distributed and is reported as a geometric mean.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ ELISA; Erhardt et al 2004.
${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001. Note that ferritin is of limited value to diagnose iron deficiency in pregnancy as values fall in late pregnancy even when bone marrow is present.
${ }^{\text {c }}$ Hemoglobin concentrations are adjusted for altitude and smoking. WHO 2011.
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {f Includes those who have completed 6-9 years of school. }}$
${ }^{8}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

Annex 11.6: Iron Deficiency Prevalence Assessed by Unadjusted and Inflammation Adjusted Soluble Transferrin Receptor (sTfR) ${ }^{\text {a }}$ in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Unadjusted for inflammation |  |  |  |  | Adjusted for inflammation ${ }^{\text {c }}$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | sTfR mg/L |  | Iron deficiency sTfR $>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}}$ |  |  | sTfR mg/L |  | $\begin{gathered} \text { Iron deficiency } \\ \text { sTfR }>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}} \\ \hline \end{gathered}$ |  |  |
|  |  | Geometric Mean | SD | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | Geometric Mean | SD | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 424 | 5.9 | 1.5 | 12.5 | (8.8-17.6) |  | 5.9 | 1.5 | 12.2 | (8.7-16.8) |  |
| Central | 428 | 5.9 | 1.5 | 11.9 | (9.4-14.9) | 0.345 | 5.9 | 1.5 | 12.0 | (9.2-15.7) |  |
| Western | 425 | 6.0 | 1.6 | 16.0 | (12.1-20.8) | 0.345 | 6.1 | 1.5 | 16.2 | (11.8-21.9) | 0.289 |
| Mid-western | 425 | 5.9 | 1.5 | 12.8 | (10.2-15.9) |  | 5.9 | 1.5 | 14.2 | (11.7-17.3) |  |
| Far-western | 427 | 6.0 | 1.5 | 13.8 | (10.6-17.8) |  | 6.0 | 1.5 | 14.1 | (10.7-18.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 355 | 5.7 | 1.5 | 13.7 | (10.4-17.8) | <0.001 | 5.7 | 1.5 | 13.3 | (9.5-18.3) |  |
| Hill | 895 | 5.6 | 1.5 | 9.9 | (8.0-12.2) |  | 5.6 | 1.5 | 10.7 | (8.4-13.5) | 0.005 |
| Terai | 879 | 6.3 | 1.5 | 15.9 | (13.3-18.8) |  | 6.3 | 1.5 | 15.7 | (13.0-18.7) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 292 | 6.1 | 1.5 | 16.8 | (12.9-21.5) | 0.052 | 6.2 | 1.5 |  | (13.1-22.0) | 0.044 |
| Rural | 1837 | 5.9 | 1.5 | 12.6 | (10.6-14.8) | 0.052 | 5.9 | 1.5 | 12.8 | (10.8-15.0) | 0.044 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |
| 15-19 | 232 | 6.6 | 1.6 | 19.4 | (13.2-27.6) |  | 6.5 | 1.6 | 18.5 | (12.3-26.8) |  |
| 20-29 | 855 | 5.8 | 1.5 | 11.4 | (9.3-14.0) | 0.019 | 5.9 | 1.5 | 11.8 | (9.6-14.4) | 0.067 |
| 30-39 | 669 | 5.9 | 1.5 | 12.6 | (10.0-15.9) | 0.019 | 5.9 | 1.5 | 12.9 | (10.2-16.2) | 0.067 |
| 40-49 | 373 | 5.9 | 1.6 | 14.6 | (11.4-18.6) |  | 6.0 | 1.6 | 15.0 | (11.6-19.1) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 590 | 5.9 | 1.5 | 11.7 | (8.8-15.3) | 4 | 5.9 | 1.5 | 12.3 | (9.3-16.0) | 813 |
| No | 233 | 6.0 | 1.6 | 11.9 | (8.0-17.2) |  | 6.1 | 1.6 | 11.9 | (8.0-17.2) | , 813 |
| Education |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 707 | 5.8 | 1.5 | 12.4 | (9.3-16.3) |  | 5.9 | 1.5 | 12.5 | (9.4-16.6) |  |
| Primary ${ }^{\text {e }}$ | 358 | 6.0 | 1.5 | 11.7 | (8.5-15.9) | 0.631 | 6.0 | 1.5 | 13.6 | (10.2-18.0) | 0.881 |
| Some secondary ${ }^{\text {f }}$ | 550 | 5.9 | 1.5 | 14.0 | (10.5-18.5) | 0.631 | 5.9 | 1.5 | 14.1 | (10.6-18.6) | 0.881 |
| SLC and above ${ }^{\text {g }}$ | 514 | 6.1 | 1.6 | 14.0 | (11.3-17.3) |  | 6.1 | 1.6 | 13.5 | (10.8-16.6) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 479 | 5.7 | 1.5 | 10.5 | (7.5-14.4) |  | 5.6 | 1.5 | 11.4 | (8.0-16.1) |  |
| Second | 447 | 5.7 | 1.5 | 12.7 | (9.6-16.7) |  | 5.8 | 1.5 | 13.7 | (10.5-17.7) |  |
| Middle | 413 | 5.9 | 1.5 | 10.2 | (7.6-13.4) | 0.028 | 5.9 | 1.5 | 9.7 | (7.1-13.2) | 0.037 |
| Fourth | 396 | 6.1 | 1.6 | 14.3 | (10.7-18.8) |  | 6.2 | 1.6 | 14.4 | (10.8-18.8) |  |
| Highest | 394 | 6.1 | 1.6 | 16.6 | (12.2-22.1) |  | 6.2 | 1.6 | 16.4 | (11.8-22.3) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 281 | 6.3 | 1.6 | 16.2 | (11.5-22.4) |  | 6.3 | 1.6 | 16.1 | (11.3-22.4) |  |
| Hill Chhetri | 508 | 5.6 | 1.5 | 9.6 | (6.5-13.9) |  | 5.6 | 1.5 | 9.2 | (6.5-12.9) |  |
| Terai Brahmin/Chhetri | 60 | 6.0 | 1.6 | 14.8 | (8.8-23.7) |  | 6.1 | 1.5 | 14.8 | (8.8-23.7) |  |
| Other Terai caste | 128 | 6.7 | 1.5 | 18.2 | (10.8-29.0) |  | 6.8 | 1.5 | 16.8 | (8.9-29.3) |  |
| Hill Dalit | 263 | 5.9 | 1.5 | 15.7 | (12.2-20.0) | 0.001 | 5.9 | 1.5 | 13.8 | (10.1-18.6) | 0.004 |
| Terai Dalit | 90 | 5.8 | 1.4 | 7.7 | (4.1-14.2) | 0.001 | 5.8 | 1.4 | 7.7 | (4.1-14.2) | 0.004 |
| Newar | 72 | 5.4 | 1.6 | 9.0 | (4.7-16.4) |  | 5.5 | 1.5 | 9.0 | (4.7-16.4) |  |
| Hill Janajati | 491 | 5.5 | 1.5 | 10.1 | (7.5-13.4) |  | 5.6 | 1.5 | 12.4 | (9.4-16.2) |  |
| Terai Janajati | 197 | 6.6 | 1.5 | 19.7 | (14.3-26.6) |  | 6.7 | 1.5 | 20.5 | (14.9-27.6) |  |
| Muslim | 37 | (6.4) | (1.7) | (13.3) | (3.5-39.0) |  | (6.5) | (1.7) | (15.8) | (5.7-36.8) |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 87 | 5.7 | 1.4 | 9.0 | (4.3-18.1) | 0.212 | 5.7 | 1.4 | 10.5 | (5.2-20.0) | 0.492 |
| No | 2,042 | 5.9 | 1.5 | 13.3 | (11.7-15.2) | 0.212 | 6.0 | 1.5 | 13.5 | (11.8-15.4) | 0.492 |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 796 | 5.9 | 1.5 | 12.7 | (10.1-15.7) | 0.713 | 6.0 | 1.5 | 12.6 | (10.1-15.6) | . 489 |
| Negative | 1,135 | 5.9 | 1.5 | 13.3 | (11.1-15.8) | 0.713 | 5.9 | 1.5 | 13.8 | (11.5-16.3) | . 489 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 981 | 5.9 | 1.5 | 12.1 | (9.7-14.9) |  | 5.9 | 1.5 | 12.2 | (9.8-15.1) |  |
| No | 1,146 | 6.0 | 1.6 | 13.9 | (12.1-15.9) | 0.232 | 6.0 | 1.5 | 14.1 | (12.2-16.3) | 0.207 |
| Don't know | 2 | * | * | * | * |  | 8 | * | * |  |  |
| Total | 2,129 | 5.9 | 1.5 | 13.1 | (11.5-14.9) |  | 6.0 | 1.5 | 13.4 | (11.6-15.3) |  |

[^71]Annex 11.7: Iron Deficiency Prevalence Assessed by Unadjusted and Inflammation Adjusted Soluble Transferrin Receptor (sTfR)a in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016


Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data. Soluble.
Transferrin Receptor (sTfR) was not normally distributed and is reported as a geometric mean
P-value obtained from Pearson's chi-square test.
${ }^{\text {a}}$ ELISA; Erhardt et.al. 2004
${ }^{\mathrm{b}}$ UNICEF, United Nations University, WHO 2001
${ }^{{ }^{c} \text { sTfR }}$ adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\text {e }}$ Includes those who have completed 0-5 years of school
${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {g }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Annex 11.8: Iron Deficiency Prevalence Assessed by Unadjusted and Inflammation Adjusted Soluble Transferrin Receptor (sTfR) ${ }^{\text {a }}$ in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Unadjusted for inflammation |  |  |  |  | Adjustedfor inflammation ${ }^{\text {c }}$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | sTfR mg/L |  | $\begin{gathered} \text { Iron deficiency } \\ \text { sTfR }>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}} \end{gathered}$ |  |  | sTfR mg/L |  | Iron deficiency sTfR $>8.3 \mathrm{mg} / \mathrm{L}^{\text {b }}$ |  |  |
|  |  | Geometric Mean | SD | \% | (95\% CI) | $\begin{gathered} \mathbf{p -} \\ \text { value } \end{gathered}$ | Geometric <br> Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 207 | 6.2 | 1.4 | 12.5 | (6.6-22.3) |  | 6.2 | 1.4 | 12.8 | (6.9-22.5) |  |
| Central | 206 | 6.5 | 1.4 | 14.4 | (10.6-19.1) |  | 6.5 | 1.4 | 14.7 | (11.0-19.4) |  |
| Western | 193 | 6.1 | 1.4 | 10.8 | (6.8-16.8) | 0.522 | 6.1 | 1.4 | 11.0 | (7.0-17.0) | 0.251 |
| Mid-western | 196 | 6.1 | 1.4 | 9.5 | (6.4-13.9) |  | 6.1 | 1.4 | 9.5 | (6.4-13.9) |  |
| Far-western | 210 | 6.2 | 1.2 | 10.8 | (6.8-16.8) |  | 6.2 | 1.2 | 8.3 | (5.3-12.9) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 154 | 6.0 | 1.3 | 8.7 | (4.4-16.8) |  | 6.0 | 1.3 | 6.7 | (3.7-11.9) |  |
| Hill | 430 | 6.1 | 1.4 | 10.6 | (8.4-13.3) | 0.200 | 6.1 | 1.4 | 10.7 | (8.6-13.4) | 0.133 |
| Terai | 428 | 6.4 | 1.4 | 14.0 | (10.1-19.0) |  | 6.4 | 1.4 | 14.0 | (10.2-19.0) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 140 | 5.9 | 1.3 | 7.8 | (4.3-13.5) | 0.089 | 6.0 | 1.3 | 7.8 | (4.3-13.5) | 090 |
| Rural | 872 | 6.3 | 1.4 | 12.9 | (10.4-16.0) |  | 6.3 | 1.4 | 12.9 | (10.3-15.9) | 090 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 202 | 6.8 | 1.4 | 18.5 | (12.8-26.1) |  | 6.8 | 1.4 | 18.1 | (12.4-25.6) |  |
| 12-13 | 263 | 6.7 | 1.4 | 13.2 | (9.1-18.8) |  | 6.7 | 1.4 | 13.2 | (9.1-18.8) |  |
| 14-15 | 234 | 6.1 | 1.3 | 10.7 | (6.5-17.2) | 0.011 | 6.2 | 1.3 | 10.8 | (6.6-17.2) | 0.017 |
| 16-17 | 165 | 5.8 | 1.3 | 9.1 | (5.1-15.8) |  | 5.9 | 1.3 | 9.4 | (5.4-16.0) |  |
| 18-19 | 148 | 5.6 | 1.3 | 7.7 | (3.6-15.5) |  | 5.7 | 1.3 | 7.7 | (3.6-15.5) |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 7 | * | * | * | * |  | * | * | * | * |  |
| Primary ${ }^{\text {e }}$ | 318 | 6.6 | 1.4 | 14.2 | (10.5-19.0) | 0.008 | 6.6 | 1.4 | 13.9 | (10.2-18.7) | 0.009 |
| Some secondary ${ }^{\text {f }}$ | 544 | 6.3 | 1.4 | 13.2 | (10.3-16.8) | 0.008 | 6.3 | 1.4 | 13.2 | (10.3-16.8) | 0.009 |
| SLC and above ${ }^{\text {g }}$ | 143 | 5.5 | 1.3 | 4.7 | (2.2-9.6) |  | 5.6 | 1.3 | 5.0 | (2.4-9.9) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 248 | 6.4 | 1.4 | 14.7 | (10.6-19.9) |  | 6.4 | 1.4 | 13.2 | (9.4-18.2) |  |
| Second | 206 | 6.4 | 1.4 | 15.2 | (9.8-22.7) |  | 6.4 | 1.4 | 15.5 | (10.1-23.0) |  |
| Middle | 209 | 6.4 | 1.4 | 15.1 | (9.5-23.2) | 0.019 | 6.4 | 1.4 | 15.7 | (10.0-23.6) | 0.023 |
| Fourth | 163 | 6.0 | 1.3 | 7.8 | (4.3-13.8) |  | 6.0 | 1.3 | 7.8 | (4.3-13.8) |  |
| Highest | 186 | 6.1 | 1.3 | 7.9 | (5.0-12.5) |  | 6.1 | 1.3 | 8.1 | (5.1-12.7) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 135 | 6.1 | 1.3 | 8.7 | (5.1-14.5) |  | 6.2 | 1.3 | 8.7 | (5.1-14.5) |  |
| Hill Chhetri | 266 | 6.1 | 1.3 | 9.7 | (6.5-14.1) |  | 6.1 | 1.3 | 10.0 | (6.8-14.4) |  |
| Terai Brahmin/Chhetri | 31 | (5.6) | (1.2) | - | - |  | (5.6) | (1.2) | - | - |  |
| Other Terai caste | 70 | 6.6 | 1.4 | 13.3 | (8.6-20.0) |  | 6.6 | 1.4 | 13.3 | (8.6-20.0) |  |
| Hill Dalit | 116 | 6.5 | 1.4 | 12.6 | (8.3-18.7) | 0.001 | 6.5 | 1.4 | 11.3 | (7.3-17.0) | <0.001 |
| Terai Dalit | 38 | (5.9) | (1.3) | (11.4) | (3.9-29.2) | 0.001 | (6.0) | (1.2) | 11.4 | (3.9-29.2) | <0.001 |
| Newar | 37 | 5.6 | 1.3 | 5.7 | (1.3-21.2) |  | 5.7 | 1.3 | 5.7 | (1.3-21.2) |  |
| Hill Janajati | 209 | 6.2 | 1.4 | 13.2 | (10.3-16.8) |  | 6.2 | 1.4 | 13.2 | (10.3-16.8) |  |
| Terai Janajati | 88 | 7.6 | 1.5 | 28.4 | (17.1-43.2) |  | 7.6 | 1.5 | 28.4 | (17.1-43.2) |  |
| Muslim | 22 | * | * | * | * |  | * | * | * | * |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 13 | * | * | * | * |  | * | * | * | * |  |
| No | 999 | 6.3 | 1.4 | 12.3 | (10.0-15.1) |  | 6.3 | 1.4 | 12.3 | (10.0-15.1) |  |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 155 | 6.3 | 1.4 | 13.8 | (9.4-19.7) | 0.553 | 6.3 | 1.4 | 12.8 | (8.6-18.7) | 0.776 |
| Negative | 857 | 6.2 | 1.4 | 12.0 | (9.6-14.9) | 0.553 | 6.3 | 1.4 | 12.1 | (9.7-15.0) | 0.776 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 621 | 6.3 | 1.4 | 11.8 | (9.3-14.9) | 0.740 | 6.3 | 1.4 | 11.5 | (9.0-14.5) | 0.474 |
| No | 391 | 6.2 | 1.4 | 12.6 | (9.2-17.1) | 0.740 | 6.3 | 1.4 | 13.0 | (9.5-17.4) | 0.474 |
| Total | 1,012 | 6.3 | 1.4 | 12.2 | (9.9-15.0) |  | 6.3 | 1.4 | 12.2 | (9.9-14.9) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data. Soluble Transferrin Receptor (sTfR) was not normally distributed and is reported as a geometric mean.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ ELISA; Erhardt et.al. 2004
${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001
${ }^{\mathrm{c}}$ sTfR adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
${ }^{\mathrm{d}}$ Includes those who have never attended school.
${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {B }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Annex 11.9: Iron Deficiency Prevalence Assessed by Unadjusted and Inflammation Adjusted Soluble Transferrin Receptor (sTfR) ${ }^{\text {a }}$ in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Unadjusted for inflammation |  |  |  |  | Adjusted for inflammation ${ }^{\text {c }}$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | sTfR mg/L |  | Iron deficiency sTfR $>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}}$ |  |  | sTfR mg/L |  | Iron deficiency sTfR >8.3 mg/L ${ }^{\text {b }}$ |  |  |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | 351 | 6.2 | 1.5 | 12.8 | (8.3-19.1) |  | 6.1 | 1.5 | 11.9 | (7.6-18.0) |  |
| Central | 352 | 6.2 | 1.5 | 15.0 | (11.6-19.2) |  | 6.1 | 1.5 | 14.7 | (11.4-18.8) |  |
| Western | 347 | 6.1 | 1.5 | 13.3 | (10.3-16.9) | 0.275 | 6.0 | 1.5 | 13.2 | (10.3-16.8) | 0.238 |
| Mid-western | 379 | 6.1 | 1.5 | 12.4 | (9.1-16.8) |  | 6.0 | 1.5 | 12.0 | (8.9-15.9) |  |
| Far-western | 411 | 6.6 | 1.5 | 18.4 | (13.8-24.0) |  | 6.5 | 1.5 | 177 | (13.3-23.3) |  |
| Ecological Region |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | 288 | 6.1 | 1.5 | 10.7 | (6.6-16.7) |  | 5.9 | 1.4 | 9.9 | (5.9-16.0) |  |
| Hill | 774 | 5.9 | 1.4 | 9.8 | (8.4-11.5) | <0.001 | 5.9 | 1.4 | 10.2 | (8.7-11.8) | <0.001 |
| Terai | 778 | 6.5 | 1.5 | 18.6 | (15.0-22.8) |  | 6.4 | 1.5 | 17.5 | (14.2-21.5) |  |
| Location |  |  |  |  |  |  |  |  |  |  |  |
| Urban | 212 | 6.1 | 1.5 | 15.4 | (10.3-22.3) | 0.689 | 6.0 | 1.5 | 14.4 | (9.4-21.3) | 0.754 |
| Rural | 1,628 | 6.2 | 1.5 | 14.1 | (12.1-16.3) | 0.689 | 6.1 | 1.5 | 13.7 | (11.8-15.8) | 0.754 |
| Age, years |  |  |  |  |  |  |  |  |  |  |  |
| 10-11 | 341 | 6.3 | 1.4 | 13.2 | (9.3-18.5) |  | 6.2 | 1.4 | 11.8 | (8.2-16.9) |  |
| 12-13 | 445 | 6.1 | 1.4 | 12.2 | (9.5-15.5) |  | 6.0 | 1.4 | 11.9 | (9.3-15.2) |  |
| 14-15 | 402 | 6.3 | 1.5 | 14.1 | (10.6-18.6) | 0.130 | 6.2 | 1.5 | 14.3 | (10.8-18.7) | 0.157 |
| 16-17 | 319 | 6.4 | 1.6 | 18.8 | (15.1-23.1) |  | 6.3 | 1.6 | 17.9 | (14.3-22.1) |  |
| 18-19 | 333 | 6.1 | 1.5 | 13.8 | (10.1-18.5) |  | 6.0 | 1.5 | 13.6 | (9.9-18.3) |  |
| Lactating Status (among those who had given birth in the last 5 years) |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 78 | 6.1 | 1.5 | 9.1 | (4.3-18.3) |  | 6.0 | 1.5 | 8.3 | (3.7-17.4) |  |
| No | 6 | * | * | * | * | - | 6.3 | 1.5 | * | * |  |
| Education |  |  |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 54 | 6.4 | 1.5 | 18.2 | (11.5-27.5) |  | 6.3 | 1.6 | 18.2 | (11.5-27.5) |  |
| Primary ${ }^{\text {e }}$ | 536 | 6.3 | 1.5 | 14.0 | (10.6-18.2) | 0.717 | 6.2 | 1.4 | 12.6 | (9.4-16.6) | 0.507 |
| Some secondary ${ }^{\text {f }}$ | 990 | 6.1 | 1.5 | 13.9 | (11.5-16.7) | 0.717 | 6.1 | 1.5 | 14.0 | (11.7-16.8) | 0.507 |
| SLC and above ${ }^{\text {g }}$ | 259 | 6.2 | 1.5 | 14.4 | (10.3-19.9) |  | 6.2 | 1.5 | 13.8 | (9.9-19.0) |  |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |  |  |
| Lowest | 490 | 6.3 | 1.5 | 14.1 | (11.4-17.3) |  | 6.2 | 1.5 | 13.2 | (10.6-16.5) |  |
| Second | 424 | 6.3 | 1.5 | 13.6 | (10.5-17.4) |  | 6.2 | 1.5 | 14.1 | (11.0-17.9) |  |
| Middle | 335 | 6.2 | 1.4 | 14.3 | (11.1-18.1) | 0.387 | 6.2 | 1.4 | 13.4 | (10.2-17.4) | 0.407 |
| Fourth | 320 | 5.9 | 1.5 | 12.2 | (8.2-17.6) |  | 5.9 | 1.5 | 11.6 | (7.7-17.1) |  |
| Highest | 271 | 6.3 | 1.5 | 17.4 | (12.7-23.5) |  | 6.2 | 1.5 | 16.8 | (12.4-22.2) |  |
| Ethnicity |  |  |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 218 | 6.0 | 1.5 | 12.0 | (7.3-19.1) |  | 5.9 | 1.5 | 10.8 | (6.5-17.5) |  |
| Hill Chhetri | 440 | 5.9 | 1.4 | 11.6 | (8.5-15.8) |  | 5.9 | 1.4 | 11.7 | (8.6-15.7) |  |
| Terai Brahmin/Chhetri | 43 | (5.2) | (1.3) | (2.3) | (0.3-16.7) |  | (5.2) | (1.3) | (2.3) | (0.3-16.7) |  |
| Other Terai caste | 124 | 6.2 | 1.4 | 16.4 | (10.8-24.2) |  | 6.1 | 1.4 | 14.1 | (9.6-20.3) |  |
| Hill Dalit | 231 | 6.4 | 1.5 | 14.6 | (10.8-19.6) | <0.001 | 6.3 | 1.5 | 14.6 | (10.8-19.6) | <0.001 |
| Terai Dalit | 90 | 6.6 | 1.6 | 17.1 | (9.7-28.4) | <0.001 | 6.5 | 1.6 | 16.1 | (8.9-27.2) | <0.001 |
| Newar | 58 | 5.8 | 1.5 | 11.6 | (5.6-22.6) |  | 5.7 | 1.5 | 11.6 | (5.6-22.6) |  |
| Hill Janajati | 414 | 6.0 | 1.4 | 11.2 | (8.7-14.4) |  | 5.9 | 1.4 | 11.8 | (9.2-14.9) |  |
| Terai Janajati | 185 | 7.6 | 1.6 | 28.5 | (22.9-34.9) |  | 7.5 | 1.6 | 28.1 | (22.5-34.5) |  |
| Muslim | 37 | (6.0) | (1.6) | (13.8) | (6.0-28.8) |  | (5.9) | (1.6) | (11.2) | (4.8-24.0) |  |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 38 | (6.2) | (1.6) | (18.4) | (7.1-39.9) | 0.493 | (6.1) | (1.6) | (18.4) | (7.1-39.9) | 0.439 |
| No | 1,802 | 6.2 | 1.5 | 14.1 | (12.2-16.3) | 0.493 | 6.1 | 1.5 | 13.6 | (11.8-15.7) | 0.439 |
| H. pylori infection |  |  |  |  |  |  |  |  |  |  |  |
| Positive | 292 | 6.5 | 1.5 | 18.3 | (13.5-24.3) | 0.023 | 6.4 | 1.5 | 18.5 | (13.7-24.5) | 0.012 |
| Negative | 1,517 | 6.1 | 1.5 | 13.3 | (11.5-15.3) | 0.023 | 6.1 | 1.5 | 12.9 | (11.2-14.7) | 0.012 |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 1,132 | 6.2 | 1.4 | 14.6 | (12.6-16.8) | 0.570 | 6.2 | 1.4 | 14.0 | (12.0-16.1) | 0.778 |
| No | 708 | 6.1 | 1.5 | 13.7 | (10.8-17.3) | 0.570 | 6.1 | 1.5 | 13.5 | (10.6-17.1) | 0.778 |
| Total | 1,840 | 6.2 | 1.5 | 14.2 | (12.3-16.3) |  | 6.1 | 1.5 | 13.7 | (11.9-15.8) |  |

[^72]Annex 11.10: Iron Deficiency Prevalence Assessed by Unadjusted and Inflammation Adjusted Soluble Transferrin Receptor (sTfR)a in Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Unadjusted for inflammation |  |  |  | Adjustedfor inflammation ${ }^{\text {c }}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | sTfR mg/L |  | Iron deficiency sTfR $>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}}$ |  | sTfR mg/L |  | Iron deficiency sTfR $>8.3 \mathrm{mg} / \mathrm{L}^{\mathrm{b}}$ |  |
|  |  | Geometric Mean | SD |  | (95\% CI) | Geometric Mean | SD | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |  |  |  |  |
| Eastern | 43 | (4.9) | 1.5) | (4.9) | (1.0-21.2) | (4.9) | (1.5) | (4.9 | (1.0-21.2) |
| Central | 44 | (5.4) | 1.6) | (16.7) | (9.0-29.0) | (5.4) | (1.6) | (16.7) | (9.0-29.0) |
| Western | 36 | (5.2) | 1.4) | (7.7) | (2.3-23.1) | (5.1) | (1.4) | (7.7) | (2.3-23.1) |
| Mid-western | 42 | (4.7) | 1.6) | (7.6) | (2.4-21.5) | (4.7) | (1.6) | (5.8) | (1.6-19.1) |
| Far-western | 36 | (5.0) | 1.4) | (8.4) | (3.4-19.2) | (5.0) | (1.4) | (8.4) | (3.4-19.2) |
| Ecological Region |  |  |  |  |  |  |  |  |  |
| Mountain | 21 | * | * | * | * | * | * | * | * |
| Hill | 86 | 4.9 | 1.4 | 7.6 | (4.6-12.2) | 4.9 | 1.5 | 7.6 | (4.6-12.2) |
| Terai | 94 | 5.3 | 1.5 | 12.3 | (6.3-22.4) | 5.3 | 1.5 | 11.8 | (6.0-21.9) |
| Location |  |  |  |  |  |  |  |  |  |
| Urban | 25 | (5.4) | (1.5) | (13.8) | (7.1-25.1) | (5.3) | (1.5) | (11.5) | (5.6-22.4) |
| Rural | 176 | 5.1 | 1.5 | 10.1 | (6.1-16.2) | 5.1 | 1.5 | 10.1 | (6.1-16.2) |
| Age, years |  |  |  |  |  |  |  |  |  |
| 15-19 | 37 | (5.2) | (1.3) | (6.9) | (1.4-27.4) | (5.1) | (1.3) | (6.9) | (1.4-27.4) |
| 20-29 | 138 | 4.9 | 1.5 | 7.6 | (4.6-12.3) | 4.9 | 1.5 | 7.3 | (4.3-11.9) |
| 30-39 | 23 | * | * | * | * | * | * | * | * |
| 40-49 | 3 | * | * | * | * | * | * | * | * |
| Trimester of Pregnancy (among pregnant women) |  |  |  |  |  |  |  |  |  |
| First trimester | 56 | 4.3 | 1.2 | 0.9 | (0.1-6.3) | 4.3 | 1.2 | - |  |
| Second trimester | 73 | 4.7 | 1.4 | 6.2 | (2.0-17.6) | 4.7 | 1.4 | 6.2 | (2.0-17.6) |
| Third trimester | 72 | 6.3 | 1.7 | 21.7 | (15.0-30.3) | 6.3 | 1.7 | 21.7 | (15.0-30.3) |
| Education |  |  |  |  |  |  |  |  |  |
| No education ${ }^{\text {d }}$ | 43 | (5.9) | (1.7) | (19.6) | (10.2-34.5) | (5.8) | (1.7) | (19.6) | (10.2-34.5) |
| Primary ${ }^{\text {e }}$ | 40 | (5.3) | (1.5) | (9.4) | (5.0-17.0) | (5.3) | (1.5) | (8.4) | (4.4-15.5) |
| Some secondary ${ }^{\text {f }}$ | 60 | 4.7 | 1.4 | 5.3 | (2.7-10.1) | 4.7 | 1.4 | 5.3 | (2.7-10.1) |
| SLC and above ${ }^{\text {g }}$ | 58 | 5.0 | 1.4 | 10.2 | (4.2-23.0) | 4.9 | 1.4 | 10.2 | (4.2-23.0) |
| Wealth Quintile |  |  |  |  |  |  |  |  |  |
| Lowest | 47 | (4.8) | (1.5) | (3.4) | (0.7-14.6) | (4.8) | 1.5) | (3.4) | (0.7-14.6) |
| Second | 40 | (5.3) | (1.7) | (10.3) | (3.4-27.6) | (5.2) | 1.7) | (9.2) | (2.7-27.1) |
| Middle | 37 | (4.9) | (1.3) | (5.5) | (3.4-8.8) | (4.9) | 1.3) | (5.5) | (3.4-8.8) |
| Fourth | 53 | 5.3 | 1.5 | 16.0 | (9.9-24.7) | 5.2 | 1.5 | 16.0 | (9.9-24.7) |
| Highest | 24 | * | * | * | * | * | * | * | * |
| Ethnicity |  |  |  |  |  |  |  |  |  |
| Hill Brahmin | 14 | * | * | * | * | * | * | * | * |
| Hill Chhetri | 54 | 4.6 | 1.4 | 8.1 | (3.1-19.7) | 4.6 | 1.4 | 8.1 | (3.1-19.7) |
| Terai Brahmin/Chhetri | 3 | * | * | * | * | * | * | * | * |
| Other Terai caste | 26 | (6.1) | (1.7) | (22.4) | (9.6-43.9) | (6.0) | (1.7) | (21.0) | (8.5-43.4) |
| Hill Dalit | 29 | (5.1) | (1.6) | (12.3) | (4.5-29.6) | (5.1) | (1.6) | (12.3) | (4.5-29.6) |
| Terai Dalit | 15 |  | , | - | * | * | * | * | * |
| Newar | 7 | * | * | * | * | * | * | * | * |
| Hill Janajati | 32 | (4.8) | (1.4) | (5.1) | (3.0-8.5) | (4.7) | (1.4) | (5.1) | (3.0-8.5) |
| Terai Janajati | 11 | * | * | * | * | * | * | * | * |
| Muslim | 10 | * | * | * | * | * | * | * | * |
| Any iron and folic acid supplementation in the last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 60 | 5.0 | 1.4 | 6.4 | (2.2-17.4) | 5.0 | 1.4 | 6.4 | (2.2-17.4) |
| No | 141 | 5.2 | 1.5 | 12.1 | (7.4-19.0) | 5.1 | 1.5 | 11.7 | (7.2-18.7) |
| Dewormed in last 6 months |  |  |  |  |  |  |  |  |  |
| Yes | 105 | 4.8 | 1.4 | 6.5 | (3.0-13.7) | 4.8 | 1.4 | 6.5 | (3.0-13.7) |
| No | 96 | 5.5 | 1.6 | 13.9 | (8.3-22.5) | 5.4 | 1.6 | 13.5 | (7.9-22.0) |
| Total | 201 | 5.1 | 1.5 | 10.5 | (6.7-16.1) | 5.1 | 1.5 | 10.2 | (6.5-15.8) |

[^73]Annex 11.11: Geometric Mean RBP and Vitamin A Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP $\mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<\mathbf{0 . 6 9}{ }^{\text {a }}$$\mu \mathrm{mol} / \mathrm{L}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 323 | 0.98 | 1.32 | 10.0 | (5.4-17.7) |  |
| Central | 346 | 0.96 | 1.30 | 10.2 | (7.4-13.8) |  |
| Western | 277 | 1.02 | 1.25 | 3.0 | (1.3-6.7) | 0.003 |
| Mid-western | 339 | 0.95 | 1.32 | 9.7 | (6.7-13.8) |  |
| Far-western | 366 | 1.00 | 1.29 | 6.4 | (3.4-11.7) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 268 | 0.98 | 1.31 | 8.4 | (5.0-13.8) |  |
| Hill | 685 | 0.99 | 1.29 | 6.5 | (5.2-8.0) | 0.037 |
| Terai | 698 | 0.96 | 1.31 | 10.1 | (7.1-14.2) |  |
| Location |  |  |  |  |  |  |
| Urban | 211 | 1.00 | 1.33 | 5.5 | (3.2-9.4) |  |
| Rural | 1,440 | 0.97 | 1.29 | 8.9 | (6.9-11.3) | 0.082 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 65 | 0.94 | 1.28 | 11.2 | (4.5-25.1) |  |
| 9-11 | 84 | 0.92 | 1.29 | 13.6 | (6.7-25.4) |  |
| 12-17 | 171 | 0.97 | 1.33 | 12.3 | (8.5-17.6) |  |
| 18-23 | 157 | 1.02 | 1.31 | 6.3 | (3.1-12.4) | 0.136 |
| 24-35 | 384 | 0.97 | 1.29 | 7.7 | (5.3-11.2) |  |
| 36-47 | 403 | 0.98 | 1.31 | 7.2 | (4.3-11.8) |  |
| 48-59 | 387 | 0.98 | 1.28 | 8.0 | (5.6-11.4) |  |
| 6-23 | 477 | 0.97 | 1.31 | 10.4 | (7.4-14.4) | 0.065 |
| 24-59 | 1,174 | 0.98 | 1.29 | 7.6 | (5.9-9.8) | 0.065 |
| Sex |  |  |  |  |  |  |
| Male | 838 | 0.97 | 1.29 | 8.1 | (6.0-10.7) |  |
| Female | 813 | 0.99 | 1.31 | 8.9 | (6.9-11.3) | . 582 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 222 | 0.94 | 1.29 | 10.2 | (6.8-15.0) |  |
| Primary ${ }^{\text {c }}$ | 170 | 0.94 | 1.31 | 12.3 | (8.0-18.5) |  |
| Some secondary ${ }^{\text {d }}$ | 238 | 1.02 | 1.29 | 5.5 | (3.5-8.4) | 0.005 |
| SLC and above ${ }^{\text {e }}$ | 220 | 1.03 | 1.29 | 4.0 | (2.0-8.0) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 462 | 0.94 | 1.31 | 12.5 | (9.0-17.1) |  |
| Second | 342 | 0.96 | 1.29 | 8.8 | (6.1-12.5) |  |
| Middle | 292 | 0.98 | 1.31 | 7.5 | (4.7-11.8) | 0.011 |
| Fourth | 304 | 0.99 | 1.28 | 8.0 | (4.0-15.3) |  |
| Highest | 251 | 1.02 | 1.30 | 5.0 | (3.3-7.5) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 149 | 1.05 | 1.25 | 4.2 | (1.5-10.7) |  |
| Hill Chhetri | 388 | 1.00 | 1.31 | 5.9 | (3.5-9.8) |  |
| Terai Brahmin/Chhetri | 42 | (1.07) | (1.33) | (9.6) | (3.2-25.6) |  |
| Other Terai caste | 131 | 0.90 | 1.31 | 15.6 | (10.6-22.2) |  |
| Hill Dalit | 263 | 1.01 | 1.28 | 3.5 | (1.9-6.2) | <0.001 |
| Terai Dalit | 85 | 0.96 | 1.32 | 11.7 | (5.4-23.5) | <0.001 |
| Newar | 50 | 0.96 | 1.33 | 9.3 | (3.3-23.3) |  |
| Hill Janajati | 375 | 0.96 | 1.28 | 9.3 | (7.6-11.3) |  |
| Terai Janajati | 117 | 1.00 | 1.26 | 6.1 | (2.3-15.2) |  |
| Muslim | 49 | (0.93) | (1.38) | (9.0) | (3.9-19.5) |  |
| Vitamin A supplement intake during mass campaign March 2016 |  |  |  |  |  |  |
| Yes | 1,531 | 0.98 | 1.29 | 8.3 | (6.5-10.5) |  |
| No | 117 | 0.95 | 1.42 | 10.7 | (5.5-19.8) | 0.411 |
| Don't know | 3 | * | * | * | * |  |
| Baal Vita micronutrient powder intake during last 7 days |  |  |  |  |  |  |
| Yes | 30 | (0.98) | (1.33) | (6.4) | (2.2-17.4) | 0.682 |
| No | 1,620 | 0.98 | 1.30 | 8.5 | (6.7-10.7) | 0.682 |
| Total | 1,651 | 0.98 | 1.30 | 8.5 | (6.7-10.6) |  |

[^74]Annex 11.12: Inflammation Adjusted Geometric Mean RBP and Vitamin A Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\mathbf{R B P}{ }^{\text {b }} \mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<\mathbf{0 . 6 9} 9^{\mathrm{a}, \mathrm{b}}$$\mu \mathrm{mol} / \mathrm{L}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 323 | 1.08 | 1.30 | 4.0 | (1.8-8.8) |  |
| Central | 346 | 1.08 | 1.26 | 1.8 | (0.9-3.7) |  |
| Western | 277 | 1.13 | 1.24 | 1.0 | (0.2-4.4) | 0.022 |
| Mid-western | 339 | 1.07 | 1.30 | 4.6 | (2.8-7.5) |  |
| Far-western | 366 | 1.12 | 1.26 | 1.8 | (0.6-5.4) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 268 | 1.12 | 1.29 | 3.4 | (1.7-6.6) |  |
| Hill | 685 | 1.11 | 1.26 | 1.5 | (0.8-2.7) | 0.075 |
| Terai | 698 | 1.07 | 1.28 | 3.3 | (1.9-5.5) |  |
| Location |  |  |  |  |  |  |
| Urban | 211 | 1.13 | 1.32 | 1.5 | (0.4-5.4) |  |
| Rural | 1,440 | 1.09 | 1.27 | 2.7 | (1.8-4.0) | 0.280 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 65 | 1.08 | 1.27 | 5.5 | (1.4-19.0) |  |
| 9-11 | 84 | 1.07 | 1.24 | 0.8 | (0.1-5.4) |  |
| 12-17 | 171 | 1.12 | 1.28 | 1.9 | (0.5-6.6) |  |
| 18-23 | 157 | 1.14 | 1.28 | 2.0 | (0.7-5.4) | 0.298 |
| 24-35 | 384 | 1.10 | 1.26 | 1.7 | (0.7-4.1) |  |
| 36-47 | 403 | 1.09 | 1.29 | 2.6 | (1.4-4.7) |  |
| 48-59 | 387 | 1.06 | 1.27 | 3.6 | (1.8-6.9) |  |
| 6-23 | 477 | 1.11 | 1.27 | 2.3 | (1.1-4.4) |  |
| 24-59 | 1,174 | 1.08 | 1.27 | 2.7 | (1.7-4.0) | 0.600 |
| Sex |  |  |  |  |  |  |
| Male | 838 | 1.08 | 1.27 | 2.6 | (1.6-4.3) | 920 |
| Female | 813 | 1.10 | 1.28 | 2.5 | (1.6-3.9) | , 920 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 222 | 1.05 | 1.26 | 2.4 | (0.8-6.6) |  |
| Primary ${ }^{\text {d }}$ | 170 | 1.05 | 1.28 | 5.2 | (2.9-9.0) | 0.010 |
| Some secondary ${ }^{\text {e }}$ | 238 | 1.14 | 1.27 | 0.3 | (0.0-2.1) |  |
| SLC and above ${ }^{\text {f }}$ | 220 | 1.15 | 1.25 | 1.4 | (0.3-5.4) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 462 | 1.06 | 1.29 | 4.8 | (3.0-7.7) |  |
| Second | 342 | 1.08 | 1.26 | 1.6 | (0.7-3.6) |  |
| Middle | 292 | 1.09 | 1.29 | 1.9 | (0.7-5.0) | 0.040 |
| Fourth | 304 | 1.09 | 1.25 | 2.6 | (1.1-6.1) |  |
| Highest | 251 | 1.13 | 1.27 | 1.4 | (0.5-3.9) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 149 | 1.16 | 1.22 | 0.4 | (0.1-3.0) |  |
| Hill Chhetri | 388 | 1.11 | 1.28 | 2.9 | (1.4-6.1) |  |
| Terai Brahmin/Chhetri | 42 | (1.16) | (1.30) | (2.0) | (0.2-14.9) |  |
| Other Terai caste | 131 | 1.02 | 1.27 | 2.7 | (1.0-7.3) |  |
| Hill Dalit | 263 | 1.14 | 1.27 | 0.5 | (0.1-3.7) | 181 |
| Terai Dalit | 85 | 1.09 | 1.29 | 4.3 | (1.5-11.7) | . 181 |
| Newar | 50 | 1.08 | 1.29 | 3.7 | (0.5-23.1) |  |
| Hill Janajati | 375 | 1.08 | 1.25 | 2.0 | (1.1-3.5) |  |
| Terai Janajati | 117 | 1.07 | 1.26 | 4.6 | (1.4-14.1) |  |
| Muslim | 49 | (1.05) | (1.40) | (7.3) | (2.3-21.0) |  |
| Vitamin A supplement intake during mass campaign March 2016 |  |  |  |  |  |  |
| Yes | 1,531 | 1.09 | 1.26 | 2.1 | (1.3-3.3) |  |
| No | 117 | 1.06 | 1.39 | 8.1 | (3.5-17.6) | $<0.001$ |
| Don't know | 3 | * | * | * | * |  |
| Baal Vita micronutrient powder intake during last 7 days |  |  |  |  |  |  |
| Yes | 30 | (1.14) | (1.27) | (0.0) | - |  |
| No | 1,620 | 1.09 | 1.27 | 2.6 | (1.8-3.8) | 0.364 |
| Total | 1,651 | 1.09 | 1.27 | 2.5 | (1.7-3.7) |  |

[^75]Annex 11.13: Geometric Mean RBP and Vitamin A Deficiency Prevalence in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP $\mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<0.64^{\text {a }} \mu \mathrm{mol} / \mathrm{L}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 207 | 1.19 | 1.34 | 1.1 | (0.3-3.7) |  |
| Central | 206 | 1.14 | 1.37 | 3.5 | (1.4-8.3) |  |
| Western | 193 | 1.19 | 1.31 | 0.0 | - | 0.012 |
| Mid-western | 196 | 1.22 | 1.31 | 0.0 | - |  |
| Far-western | 210 | 1.18 | 1.33 | 2.6 | (1.1-6.1) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 154 | 1.26 | 1.35 | 1.0 | (0.1-7.3) |  |
| Hill | 430 | 1.22 | 1.34 | 1.6 | (1.2-2.2) | 0.938 |
| Terai | 428 | 1.13 | 1.33 | 1.9 | (0.6-5.7) |  |
| Location |  |  |  |  |  |  |
| Urban | 140 | 1.22 | 1.30 | 0.0 | - | 0.096 |
| Rural | 872 | 1.17 | 1.35 | 2.0 | (1.0-3.8) |  |
| Age, years |  |  |  |  |  |  |
| 10-11 | 202 | 1.00 | 1.28 | 4.5 | (2.6-7.6) |  |
| 12-13 | 263 | 1.07 | 1.30 | 2.3 | (0.7-6.8) |  |
| 14-15 | 234 | 1.15 | 1.29 | 0.0 | - | 0.002 |
| 16-17 | 165 | 1.32 | 1.31 | 1.4 | (0.2-8.9) |  |
| 18-19 | 148 | 1.53 | 1.26 | 0.0 | - |  |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 7 | * | * | * | * |  |
| Primary ${ }^{\text {c }}$ | 318 | 1.03 | 1.31 | 3.4 | (1.8-6.6) | 0.010 |
| Some secondary ${ }^{\text {d }}$ | 544 | 1.19 | 1.31 | 1.2 | (0.5-2.6) | 0.010 |
| SLC and above ${ }^{\text {e }}$ | 143 | 1.49 | 1.30 | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 248 | 1.14 | 1.37 | 4.6 | (2.6-8.1) |  |
| Second | 206 | 1.14 | 1.37 | 1.7 | (0.4-6.7) |  |
| Middle | 209 | 1.17 | 1.32 | 1.8 | (0.4-7.0) | 0.004 |
| Fourth | 163 | 1.16 | 1.31 | 0.6 | (0.2-2.3) |  |
| Highest | 186 | 1.27 | 1.31 | 0.0 | - |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 135 | 1.31 | 1.29 | 0.0 | - |  |
| Hill Chhetri | 266 | 1.21 | 1.30 | 0.9 | (0.3-2.8) |  |
| Terai Brahmin/Chhetri | 31 | (1.30) | (1.30) | (0.9) | (0.1-7.2) |  |
| Other Terai caste | 70 | 1.03 | 1.32 | 5.4 | (1.3-20.0) |  |
| Hill Dalit | 116 | 1.24 | 1.34 | 0.9 | (0.1-6.0) | 0.036 |
| Terai Dalit | 38 | (1.08) | (1.31) | (0.0) | - | 0.036 |
| Newar | 37 | (1.32) | (1.37) | (0.0) | - |  |
| Hill Janajati | 209 | 1.15 | 1.36 | 2.2 | (1.8-2.6) |  |
| Terai Janajati | 88 | 1.14 | 1.38 | 2.9 | (0.9-8.5) |  |
| Muslim | 22 | * | * | * | * |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 0 | * | * | * | * |  |
| No | 1,012 | 1.18 | 1.34 | 1.7 | (0.9-3.3) |  |
| Total | 1,012 | 1.18 | 1.34 | 1.7 | (0.9-3.3) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
| P -value obtained from Pearson's chi-square test. |  |  |  |  |  |  |
| ${ }^{\text {a }}$ No retinol was collected among adolescents and the RBP cut off for women of reproductive age was applied to adolescents. A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$ among women of reproductive age. |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |
| ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |

Annex 11.14: Inflammation Adjusted Geometric Mean RBP and Vitamin A Deficiency Prevalence in Adolescent Boys 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP ${ }^{\text {b }}$ |  | $\begin{gathered} \hline \text { Vitamin A deficiency RBP } \\ <0.64^{\mathrm{a}, \mathrm{~b}} \end{gathered}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 207 | 1.20 | 1.34 | 0.9 | (0.2-4.0) |  |
| Central | 206 | 1.15 | 1.37 | 3.5 | (1.4-8.3) |  |
| Western | 193 | 1.20 | 1.31 | 0.0 | - | 0.006 |
| Mid-western | 196 | 1.23 | 1.31 | 0.0 | - |  |
| Far-western | 210 | 1.19 | 1.32 | 2.6 | (1.1-6.2) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 154 | 1.28 | 1.34 | 1.0 | (0.1-7.4) |  |
| Hill | 430 | 1.23 | 1.34 | 1.5 | (1.1-2.0) | 0.836 |
| Terai | 428 | 1.14 | 1.33 | 1.9 | (0.6-5.7) |  |
| Location |  |  |  |  |  |  |
| Urban | 140 | 1.24 | 1.30 | 0.0 | - | 0.096 |
| Rural | 872 | 1.18 | 1.34 | 1.9 | (1.0-3.8) | 0.096 |
| Age, years |  |  |  |  |  |  |
| 10-11 | 202 | 1.01 | 1.27 | 4.2 | (2.3-7.4) |  |
| 12-13 | 263 | 1.08 | 1.30 | 2.3 | (0.7-6.8) |  |
| 14-15 | 234 | 1.16 | 1.29 | 0.0 | - | 0.003 |
| 16-17 | 165 | 1.32 | 1.31 | 1.4 | (0.2-8.9) |  |
| 18-19 | 148 | 1.55 | 1.26 | 0.0 | - |  |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 7 | * | * | * | * |  |
| Primary ${ }^{\text {d }}$ | 318 | 1.04 | 1.31 | 3.3 | (1.6.-6.5) |  |
| Some secondary ${ }^{\text {e }}$ | 544 | 1.20 | 1.31 | 1.2 | (0.5-2.6) | 0.010 |
| SLC and above ${ }^{\text {f }}$ | 143 | 1.50 | 1.30 | 0.0 | (0.5-2.6) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 248 | 1.16 | 1.36 | 4.6 | (2.6-8.1) |  |
| Second | 206 | 1.15 | 1.37 | 1.5 | (0.3-7.2) |  |
| Middle | 209 | 1.18 | 1.33 | 1.8 | (0.4-7.0) | 0.003 |
| Fourth | 163 | 1.17 | 1.31 | 0.6 | (0.2-2.3) |  |
| Highest | 186 | 1.28 | 1.31 | 0.0 | - |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 135 | 1.32 | 1.29 | 0.0 | - |  |
| Hill Chhetri | 266 | 1.22 | 1.30 | 0.9 | (0.3-2.8) |  |
| Terai Brahmin/Chhetri | 31 | (1.31) | (1.29) | (0.9) | (0.1-7.2) |  |
| Other Terai caste | 70 | 1.04 | 1.32 | 5.4 | (1.3-20.0) |  |
| Hill Dalit | 116 | 1.25 | 1.35 | 0.9 | (1.0-6.0) |  |
| Terai Dalit | 38 | (1.09) | (1.31) | (0.0) | - | 0.040 |
| Newar | 37 | (1.33) | (1.37) | (0.0) | - |  |
| Hill Janajati | 209 | 1.16 | 1.35 | 2.2 | (1.8-2.6) |  |
| Terai Janajati | 88 | 1.15 | 1.38 | 2.3 | (0.5-9.0) |  |
| Muslim | 22 | * | * | * | * |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 0 | * | * | * | * |  |
| No | 1,012 | 1.19 | 1.34 | 1.7 | (0.8-3.2) |  |
| Total | 1,012 | 1.19 | 1.34 | 1.7 | (0.8-3.2) |  |

[^76]Annex 11.15: Geometric Mean RBP and Vitamin A Deficiency Prevalence in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP |  | Vitamin A deficiency RBP $<0.64{ }^{\text {a }}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  | 0.008 |
| Eastern | 351 | 1.11 | 1.33 | 2.7 | (0.7-9.6) |  |
| Central | 352 | 1.06 | 1.31 | 4.1 | (2.5-6.6) |  |
| Western | 347 | 1.13 | 1.27 | 1.4 | (0.5-3.9) |  |
| Mid-western | 379 | 1.17 | 1.30 | 1.2 | (0.5-3.3) |  |
| Far-western | 411 | 1.17 | 1.30 | 0.7 | (0.2-2.2) |  |
| Ecological Region |  |  |  |  |  | 0.002 |
| Mountain | 288 | 1.17 | 1.34 | 2.2 | (0.9-5.5) |  |
| Hill | 774 | 1.16 | 1.29 | 1.1 | (0.6-2.0) |  |
| Terai | 778 | 1.06 | 1.31 | 3.7 | (2.1-6.5) |  |
| Location |  |  |  |  |  | 0.206 |
| Urban | 212 | 1.07 | 1.27 | 1.0 | (0.2-5.8) |  |
| Rural | 1,628 | 1.12 | 1.31 | 2.6 | (1.7-4.1) |  |
| Age, years |  |  |  |  |  | <0.001 |
| 10-11 | 341 | 0.96 | 1.28 | 6.3 | (2.7-13.7) |  |
| 12-13 | 445 | 1.05 | 1.27 | 3.0 | (1.6-5.5) |  |
| 14-15 | 402 | 1.13 | 1.31 | 2.2 | (0.9-5.3) |  |
| 16-17 | 319 | 1.21 | 1.28 | 0.4 | (0.1-2.6) |  |
| 18-19 | 333 | 1.25 | 1.29 | 0.2 | (0.0-1.3) |  |
| Education |  |  |  |  |  | <0.001 |
| No education ${ }^{\text {b }}$ | 54 | 1.08 | 1.26 | 3.3 | (0.7-14.3) |  |
| Primary ${ }^{\text {c }}$ | 536 | 1.00 | 1.31 | 5.7 | (3.2-10.0) |  |
| Some secondary ${ }^{\text {d }}$ | 990 | 1.15 | 1.29 | 1.2 | (0.7-2.3) |  |
| SLC and above ${ }^{\text {e }}$ | 259 | 1.22 | 1.28 | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  | 0.021 |
| Lowest | 490 | 1.12 | 1.33 | 3.9 | (1.9-7.6) |  |
| Second | 424 | 1.10 | 1.32 | 3.8 | (1.6-8.6) |  |
| Middle | 335 | 1.13 | 1.29 | 1.5 | (0.7-3.3) |  |
| Fourth | 320 | 1.09 | 1.31 | 1.6 | (0.5-5.5) |  |
| Highest | 271 | 1.11 | 1.28 | 0.7 | (0.1-4.8) |  |
| Ethnicity |  |  |  |  |  | $<0.001$ |
| Hill Brahmin | 218 | 1.18 | 1.30 | 1.0 | (0.2-6.0) |  |
| Hill Chhetri | 440 | 1.17 | 1.28 | 0.3 | (0.1-0.9) |  |
| Terai Brahmin/Chhetri | 43 | (1.06) | (1.28) | (0.0) | - |  |
| Other Terai caste | 124 | 0.98 | 1.33 | 6.8 | (3.8-11.9) |  |
| Hill Dalit | 231 | 1.14 | 1.30 | 1.4 | (0.5-4.2) |  |
| Terai Dalit | 90 | 0.98 | 1.32 | 11.8 | (5.3-24.2) |  |
| Newar | 58 | 1.15 | 1.26 | 0.0 | - |  |
| Hill Janajati | 414 | 1.14 | 1.32 | 1.5 | (0.9-2.6) |  |
| Terai Janajati | 185 | 1.12 | 1.26 | 1.3 | (0.2-8.2) |  |
| Muslim | 37 | (1.03) | (1.21) | (0.0) | - |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 3 | * | * | * | * |  |
| No | 1,837 | 1.11 | 1.31 | 2.5 | (1.6-3.8) |  |
| Total | 1,840 | 1.11 | 1.31 | 2.5 | (1.6-3.8) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 unweighted cases. |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. ${ }^{\mathrm{a}}$ CDC, 2018 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |
| ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more | ars of sch | l. SLC: School | ing Certi |  |  |  |

Annex 11.16: Inflammation Adjusted Geometric Mean RBP and Vitamin A Deficiency Prevalence in Non-Pregnant Adolescent Girls 10-19 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP ${ }^{\text {b }}$ |  | $\underset{<0.644^{\mathrm{a}, \mathrm{b}}}{\text { Vitamin }} \mathbf{~ A ~ d e f i c i n c y ~ R B P ~}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  | 0.005 |
| Eastern | 351 | 1.1 | 1.3 | 2.0 | (0.6-6.8) |  |
| Central | 352 | 1.1 | 1.3 | 3.6 | (2.1-6.3) |  |
| Western | 347 | 1.2 | 1.3 | 1.0 | (0.3-3.6) |  |
| Mid-western | 379 | 1.2 | 1.3 | 0.9 | (0.3-2.9) |  |
| Far-western | 411 | 1.2 | 1.3 | 0.7 | (0.2-2.2) |  |
| Ecological Region |  |  |  |  |  | <0.001 |
| Mountain | 288 | 1.2 | 1.3 | 1.9 | (0.7-5.1) |  |
| Hill | 774 | 1.2 | 1.3 | 0.6 | (0.2-1.7) |  |
| Terai | 778 | 1.1 | 1.3 | 3.3 | (1.9-5.6) |  |
| Location |  |  |  |  |  | 0.323 |
| Urban | 212 | 1.1 | 1.3 | 1.0 | (0.2-5.8) |  |
| Rural | 1,628 | 1.1 | 1.3 | 2.1 | (1.3-3.4) |  |
| Age, years |  |  |  |  |  | $<0.001$ |
| 10-11 | 341 | 1.0 | 1.3 | 5.4 | (2.5-11.7) |  |
| 12-13 | 445 | 1.1 | 1.3 | 2.4 | (1.1-5.2) |  |
| 14-15 | 402 | 1.2 | 1.3 | 1.6 | (0.5-4.9) |  |
| 16-17 | 319 | 1.2 | 1.3 | 0.4 | (0.1-2.6) |  |
| 18-19 | 333 | 1.3 | 1.3 | 0.2 | (0.0-1.3) |  |
| Education |  |  |  |  |  | <0.001 |
| No education ${ }^{\text {c }}$ | 54 | 1.1 | 1.3 | 3.3 | (0.7-14.3) |  |
| Primary ${ }^{\text {d }}$ | 536 | 1.0 | 1.3 | 4.9 | (2.8-8.3) |  |
| Some secondary ${ }^{\text {e }}$ | 990 | 1.2 | 1.3 | 0.8 | (0.4-2.0) |  |
| SLC and above ${ }^{\text {f }}$ | 259 | 1.2 | 1.3 | 0.0 | - |  |
| Wealth Quintile |  |  |  |  |  | 0.019 |
| Lowest | 490 | 1.1 | 1.3 | 3.0 | (1.3-6.7) |  |
| Second | 424 | 1.1 | 1.3 | 3.4 | (1.4-8.4) |  |
| Middle | 335 | 1.2 | 1.3 | 0.8 | (0.8-3.7) |  |
| Fourth | 320 | 1.1 | 1.3 | 1.6 | (0.5-5.5) |  |
| Highest | 271 | 1.1 | 1.3 | 0.7 | (0.1-4.8) |  |
|  |  |  |  |  |  | $<0.001$ |
| Hill Brahmin | 218 | 1.2 | 1.3 | 1.0 | (0.2-6.0) |  |
| Hill Chhetri | 440 | 1.2 | 1.3 | 0.3 | (0.1-0.9) |  |
| Terai Brahmin/Chhetri | 43 | (1.1) | (1.3) | (0.0) | - |  |
| Other Terai caste | 124 | 1.0 | 1.3 | 6.8 | (3.8-11.9) |  |
| Hill Dalit | 231 | 1.2 | 1.3 | 0.9 | (0.2-3.4) |  |
| Terai Dalit | 90 | 1.0 | 1.3 | 10.7 | (4.5-23.6) |  |
| Newar | 58 | 1.2 | 1.3 | 0.0 | - |  |
| Hill Janajati | 414 | 1.2 | 1.3 | 0.8 | (0.3-2.1) |  |
| Terai Janajati | 185 | 1.1 | 1.3 | 0.0 | - |  |
| Muslim | 37 | (1.1) | (1.2) | (0.0) | - |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 3 | * | * | * | * |  |
| No | 1,837 | 1.1 | 1.3 | 2.0 | (1.3-3.2) | - |
| Total | 1,840 | 1.1 | 1.3 | 2.0 | (1.3-3.2) |  |

[^77]Annex 11.17: Geometric Mean RBP and Vitamin A Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP $\mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<0.64{ }^{\text {a }} \mu \mathrm{mol} / \mathrm{L}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  | 0.696 |
| Eastern | 424 | 1.38 | 1.32 | 0.4 | (0.1-1.2) |  |
| Central | 428 | 1.37 | 1.32 | 0.8 | (0.2-2.4) |  |
| Western | 425 | 1.38 | 1.34 | 0.2 | (0.0-1.8) |  |
| Mid-western | 425 | 1.38 | 1.32 | 0.6 | (0.1-2.3) |  |
| Far-western | 427 | 1.32 | 1.34 | 1.0 | (0.3-2.7) |  |
| Ecological Region |  |  |  |  |  | 0.322 |
| Mountain | 355 | 1.45 | 1.41 | 1.5 | (0.5-4.5) |  |
| Hill | 895 | 1.43 | 1.32 | 0.5 | (0.2-1.5) |  |
| Terai | 879 | 1.32 | 1.31 | 0.5 | (0.2-1.4) |  |
| Location |  |  |  |  |  | 0.587 |
| Urban | 292 | 1.32 | 1.31 | 0.4 | (0.0-2.5) |  |
| Rural | 1,837 | 1.38 | 1.33 | 0.6 | (0.3-1.2) |  |
| Age, years |  |  |  |  |  | 0.024 |
| 15-19 | 232 | 1.22 | 1.30 | 0.2 | (0.0-1.5) |  |
| 20-29 | 855 | 1.32 | 1.32 | 1.1 | (0.5-2.3) |  |
| 30-39 | 669 | 1.43 | 1.32 | 0.3 | (0.1-1.0) |  |
| 40-49 | 373 | 1.47 | 1.33 | 0.0 | - |  |
| Education |  |  |  |  |  | 0.657 |
| No education ${ }^{\text {b }}$ | 707 | 1.40 | 1.34 | 0.9 | (0.3-2.4) |  |
| Primary ${ }^{\text {c }}$ | 358 | 1.35 | 1.36 | 0.3 | (0.1-1.2) |  |
| Some secondary ${ }^{\text {d }}$ | 550 | 1.38 | 1.32 | 0.5 | (0.2-1.5) |  |
| SLC and above ${ }^{\text {e }}$ | 514 | 1.35 | 1.29 | 0.5 | (0.1-2.4) |  |
| Wealth Quintile |  |  |  |  |  | 0.925 |
| Lowest | 479 | 1.42 | 1.37 | 0.9 | (0.3-2.2) |  |
| Second | 447 | 1.40 | 1.33 | 0.6 | (0.1-2.5) |  |
| Middle | 413 | 1.33 | 1.33 | 0.4 | (0.1-1.4) |  |
| Fourth | 396 | 1.36 | 1.33 | 0.5 | (0.1-3.3) |  |
| Highest | 394 | 1.37 | 1.29 | 0.6 | (0.1-2.6) |  |
| Ethnicity |  |  |  |  |  | 0.132 |
| Hill Brahmin | 281 | 1.40 | 1.29 | 0.0 | - |  |
| Hill Chhetri | 508 | 1.40 | 1.31 | 0.6 | (0.2-1.8) |  |
| Terai Brahmin/Chhetri | 60 | 1.27 | 1.31 | 0.0 | - |  |
| Other Terai caste | 128 | 1.18 | 1.33 | 1.7 | (0.4-6.8) |  |
| Hill Dalit | 263 | 1.42 | 1.32 | 0.0 | - |  |
| Terai Dalit | 90 | 1.28 | 1.24 | 0.0 | - |  |
| Newar | 72 | 1.34 | 1.25 | 0.0 | - |  |
| Hill Janajati | 491 | 1.48 | 1.38 | 1.1 | (0.4-3.1) |  |
| Terai Janajati | 197 | 1.35 | 1.29 | 0.7 | (0.2-2.8) |  |
| Muslim | 37 | (1.34) | (1.28) | (0.0) | - |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  | 0.866 |
| Yes | 8 | * | * | * | * |  |
| No | 2,121 | 1.37 | 1.33 | 0.6 | (0.3-1.1) |  |
| Total | 2,129 | 1.37 | 1.33 | 0.6 | (0.3-1.1) |  |

[^78]Annex 11.18: Inflammation Adjusted Geometric Mean RBP and Vitamin A Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\mathbf{R B P}{ }^{\text {b }} \mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<\mathbf{0 . 6 4}{ }^{\text {a, }} \boldsymbol{\mu} \mu \mathrm{mol} / \mathrm{L}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  | 0.772 |
| Eastern | 424 | 1.38 | 1.32 | 0.4 | (0.1-1.2) |  |
| Central | 428 | 1.37 | 1.32 | 0.8 | (0.2-2.4) |  |
| Western | 425 | 1.38 | 1.34 | 0.2 | (0.0-1.8) |  |
| Mid-western | 425 | 1.38 | 1.32 | 0.6 | (0.1-2.3) |  |
| Far-western | 427 | 1.33 | 1.34 | 0.6 | (0.2-2.1) |  |
| Ecological Region |  |  |  |  |  | 0.322 |
| Mountain | 355 | 1.46 | 1.40 | 1.5 | (0.5-4.5) |  |
| Hill | 895 | 1.43 | 1.32 | 0.5 | (0.2-1.5) |  |
| Terai | 879 | 1.32 | 1.31 | 0.4 | (0.1-1.4) |  |
| Location |  |  |  |  |  | 0.587 |
| Urban | 292 | 1.32 | 1.31 | 0.4 | (0.0-2.5) |  |
| Rural | 1,837 | 1.38 | 1.33 | 0.6 | (0.3-1.2) |  |
| Age, years |  |  |  |  |  | 0.043 |
| 15-19 | 232 | 1.23 | 1.30 | 0.2 | (0.0-1.5) |  |
| 20-29 | 855 | 1.33 | 1.32 | 1.0 | (0.5-2.3) |  |
| 30-39 | 669 | 1.43 | 1.32 | 0.3 | (0.1-1.0) |  |
| 40-49 | 373 | 1.47 | 1.33 | 0.0 | - |  |
| Education |  |  |  |  |  | 0.826 |
| No education ${ }^{\text {c }}$ | 707 | 1.40 | 1.34 | 0.7 | (0.2-2.3) |  |
| Primary ${ }^{\text {e }}$ | 358 | 1.36 | 1.36 | 0.3 | (0.1-1.2) |  |
| Some secondary ${ }^{\text {e }}$ | 550 | 1.38 | 1.31 | 0.5 | (0.2-1.5) |  |
| SLC and above ${ }^{\text {f }}$ | 514 | 1.35 | 1.29 | 0.5 | (0.1-2.4) |  |
| Wealth Quintile |  |  |  |  |  | 0.925 |
| Lowest | 479 | 1.42 | 1.37 | 0.9 | (0.3-2.2) |  |
| Second | 447 | 1.40 | 1.33 | 0.4 | (0.1-2.7) |  |
| Middle | 413 | 1.34 | 1.33 | 0.4 | (0.1-1.4) |  |
| Fourth | 396 | 1.36 | 1.32 | 0.5 | (0.1-3.3) |  |
| Highest | 394 | 1.37 | 1.29 | 0.6 | (0.1-2.6) |  |
| Ethnicity |  |  |  |  |  | 0.132 |
| Hill Brahmin | 281 | 1.41 | 1.29 | 0.0 | - |  |
| Hill Chhetri | 508 | 1.41 | 1.31 | 0.6 | (0.2-1.8) |  |
| Terai Brahmin/Chhetri | 60 | 1.27 | 1.31 | 0.0 | - |  |
| Other Terai caste | 128 | 1.18 | 1.33 | 1.7 | (0.4-6.8) |  |
| Hill Dalit | 263 | 1.42 | 1.32 | 0.0 | - |  |
| Terai Dalit | 90 | 1.28 | 1.24 | 0.0 | - |  |
| Newar | 72 | 1.34 | 1.25 | 0.0 | - |  |
| Hill Janajati | 491 | 1.48 | 1.38 | 1.1 | (0.4-3.1) |  |
| Terai Janajati | 197 | 1.35 | 1.29 | 0.4 | (0.1-2.6) |  |
| Muslim | 37 | (1.35) | (1.28) | (0.0) | - |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  | - |
| Yes | 8 | * | * | * | * |  |
| No | 2,121 | 1.37 | 1.33 | 0.5 | (0.3-1.1) |  |
| Total | 2,129 | 1.37 | 1.33 | 0.5 | (0.3-1.1) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
P -value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$.
${ }^{\text {b }}$ RBP adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted.
${ }^{\text {c Includes those who have never attended school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {e }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {f I Includes tho }}$ those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Annex 11.19: Geometric Mean RBP and Vitamin A Deficiency Prevalence in Pregnant Women 1549 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | RBP $\mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<0.64{ }^{\text {a }} \mu \mathrm{mol} / \mathrm{L}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |
| Eastern | 43 | (1.30) | (1.33) | (0.0) | - |
| Central | 44 | (1.27) | (1.36) | (2.4) | (0.3-15.5) |
| Western | 36 | (1.32) | (1.34) | (2.5) | (0.3-16.4) |
| Mid-western | 42 | (1.23) | (1.33) | (0.0) |  |
| Far-western | 36 | (1.41) | (1.28) | (0.0) | - |
| Ecological Region |  |  |  |  |  |
| Mountain | 21 | * | * | * | * |
| Hill | 86 | 1.40 | 1.28 | 0.0 | - |
| Terai | 94 | 1.22 | 1.37 | 2.3 | (0.5-10.0) |
| Location |  |  |  |  |  |
| Urban | 25 | (1.36) | (1.30) | (0.0) | - |
| Rural | 176 | 1.29 | 1.35 | 1.5 | (0.3-6.3) |
| Age, years |  |  |  |  |  |
| 15-19 | 37 | (1.14) | (1.26) | (2.3) | (0.3-15.1) |
| 20-29 | 138 | 1.32 | 1.35 | 1.3 | (0.2-9.1) |
| 30-49 | 26 | (1.39) | (1.36) | (0.0) | - |
| Education |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 43 | (1.16) | (1.35) | (4.7) | (0.5-31.0) |
| Primary ${ }^{\text {c }}$ | 40 | (1.30) | (1.31) | (0.0) | - |
| Some secondary ${ }^{\text {d }}$ | 60 | 1.33 | 1.35 | 1.5 | (0.2-10.1) |
| SLC and above ${ }^{\text {e }}$ | 58 | 1.34 | 1.34 | 0.0 | - |
| Wealth Quintile |  |  |  |  |  |
| Lowest | 47 | (1.28) | (1.36) | (0.0) | - |
| Second | 40 | (1.30) | (1.35) | (4.5) | (0.6-28.1) |
| Middle | 37 | (1.29) | (1.35) | (0.0) | - |
| Fourth | 53 | 1.23 | 1.33 | 1.4 | (0.2-10.0) |
| Highest | 24 | * | * | * | * |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |
| Yes | 1 |  | * | * | * |
| No | 200 | 1.29 | 1.34 | 1.3 | (0.3-5.7) |
| Total | 201 | 1.29 | 1.34 | 1.3 | (0.3-5.7) |
| Note: N unweighted. All estimates account for weighting and co Figures in parentheses are based on 25-49 sample size and the e An asterisk indicates that a figure is based on fewer than 25 unw Sample size might vary slightly due to missing data. <br> For all strifitications, no significant test were performed becaus equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$. <br> ${ }^{\mathrm{b}}$ Includes those who have never attended school. <br> ${ }^{\text {CIncludes those who have completed 0-5 years of school. }}$ <br> ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school | lex sam nate sho hted ca mall sam SLC: Sc | design. be interpreted nd has been su size ${ }^{\text {a }} \mathrm{A}$ linear Leaving Certi | ution. <br> d. <br> on was | to calcula | BP cut off |

Annex 11.20: Inflammation Adjusted Geometric Mean RBP and Vitamin A Deficiency Prevalence in Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | $\mathbf{R B P}{ }^{\text {b }} \mu \mathrm{mol} / \mathrm{L}$ |  | Vitamin A deficiency RBP $<0.64^{\text {a, }} \boldsymbol{\mu} \mathrm{mol} / \mathrm{L}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |
| Developmental Region |  |  |  |  |  |
| Eastern | 43 | (1.39) | (1.31) | (0.0) | - |
| Central | 44 | (1.35) | (1.34) | (2.4) | (0.3-15.5) |
| Western | 36 | (1.42) | (1.29) | (0.0) | - |
| Mid-western | 42 | (1.32) | (1.32) | (0.0) | - |
| Far-western | 36 | (1.50) | (1.28) | (0.0) | - |
| Ecological Region |  |  |  |  |  |
| Mountain | 21 | * | * | * | * |
| Hill | 86 | 1.49 | 1.27 | 0.0 | - |
| Terai | 94 | 1.30 | 1.34 | 1.6 | (0.2-10.9) |
| Location |  |  |  |  |  |
| Urban | 25 | (1.46) | (1.28) | (0.0) | - |
| Rural | 176 | 1.37 | 1.32 | 1.0 | (0.1-7.0) |
| Age, years |  |  |  |  |  |
| 15-19 | 37 | (1.22) | (1.20) | (0.0) | - |
| 20-29 | 138 | 1.40 | 1.33 | 1.3 | (0.2-9.1) |
| 30-49 | 26 | (1.48) | (1.33) | (0.0) | - |
| Education |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 43 | (1.23) | (1.32) | (4.7) | (0.5-31.0) |
| Primary ${ }^{\text {d }}$ | 40 | (1.38) | (1.30) | (0.0) | - |
| Some secondary ${ }^{\text {e }}$ | 60 | 1.41 | 1.31 | 0.0 | - |
| SLC and above ${ }^{\text {f }}$ | 58 | 1.44 | 1.32 | 0.0 | - |
| Wealth Quintile |  |  |  |  |  |
| Lowest | 47 | (1.37) | (1.33) | (0.0) | - |
| Second | 40 | (1.37) | (1.32) | (4.5) | (0.6-28.1) |
| Middle | 37 | (1.35) | (1.35) | (0.0) | - |
| Fourth | 53 | 1.33 | 1.30 | 0.0 | - |
| Highest | 24 | * | * | * | * |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |
| Yes | 1 | * | * | * | * |
| No | 200 | 1.38 | 1.32 | 0.9 | (0.1-6.3) |
| Total | 201 | 1.38 | 1.32 | 0.9 | (0.1-6.3) |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
Sample size might vary slightly due to missing data.
For all strifitications, no significant test were performed because small sample size ${ }^{\text {a }}$ A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$.
${ }^{\mathrm{b}}$ RBP adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted.
${ }^{\text {c I Includes those who have never attended school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
${ }^{\mathrm{e}}$ Includes those who have completed 6-9 years of school.
${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

Annex 11.21: Geometric Mean Retinol and Retinol Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Retinol $\mu \mathrm{mol} / \mathrm{L}$ |  | Retinol $\leq 0.7^{\text {a }} \mu \mathrm{mol} / \mathrm{L}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | $p$-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 139 | 0.95 | 1.43 | 16.0 | (10.2-24.3) |  |
| Central | 125 | 0.93 | 1.46 | 13.9 | (8.6-21.6) |  |
| Western | 131 | 1.06 | 1.38 | 9.1 | (4.9-16.3) | 0.340 |
| Mid-western | 129 | 0.99 | 1.40 | 8.8 | (4.8-15.4) |  |
| Far-western | 135 | 1.00 | 1.41 | 11.1 | (6.9-17.3) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 106 | 1.06 | 1.31 | 6.0 | (2.8-12.6) |  |
| Hill | 276 | 1.02 | 1.40 | 9.2 | (6.8-12.4) | 0.016 |
| Terai | 277 | 0.92 | 1.46 | 16.3 | (11.4-22.7) |  |
| Location |  |  |  |  |  |  |
| Urban | 86 | 0.93 | 1.42 | 11.9 | (6.1-21.9) | 0.817 |
| Rural | 573 | 0.98 | 1.43 | 12.6 | (9.6-16.3) | , 817 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 8 | * | * | * | * |  |
| 9-11 | 23 | (0.85) | (1.39) | (21.7) | (8.5-45.0) |  |
| 12-17 | 49 | (0.94) | (1.42) | (15.8) | (6.5-33.6) |  |
| 18-23 | 53 | 1.10 | 1.34 | 2.5 | (0.8-7.7) | 0.040 |
| 24-35 | 156 | 0.99 | 1.41 | 12.4 | (7.9-19.0) |  |
| 36-47 | 187 | 1.01 | 1.43 | 9.7 | (5.7-16.1) |  |
| 48-59 | 183 | 0.92 | 1.46 | 16.3 | (11.1-23.2) |  |
| 6-23 | 133 | 0.98 | 1.41 | 11.6 | (6.7-19.4) | 0.693 |
| 24-59 | 526 | 0.97 | 1.44 | 12.8 | (9.7-16.5) | 0.693 |
| Sex |  |  |  |  |  |  |
| Male | 333 | 0.96 | 1.41 | 12.3 | (9.1-16.4) | 0.892 |
| Female | 326 | 0.98 | 1.46 | 12.8 | (9.0-17.8) | 0.892 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 85 | 0.92 | 1.46 | 14.9 | (7.6-27.2) |  |
| Primary ${ }^{\text {c }}$ | 74 | 1.00 | 1.43 | 8.8 | (4.7-15.8) | 0.429 |
| Some secondary ${ }^{\text {d }}$ | 94 | 1.07 | 1.36 | 7.5 | (2.3-22.0) |  |
| SLC and above ${ }^{\text {e }}$ | 106 | 0.99 | 1.41 | 10.7 | (5.8-18.9) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 163 | 0.94 | 1.52 | 14.7 | (10.6-19.9) |  |
| Second | 134 | 1.00 | 1.39 | 10.6 | (6.8-16.2) |  |
| Middle | 130 | 0.97 | 1.47 | 9.8 | (5.6-16.7) | 0.030 |
| Fourth | 122 | 0.98 | 1.43 | 19.5 | (11.6-30.8) |  |
| Highest | 110 | 0.98 | 1.32 | 8.3 | (4.5-14.8) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 65 | 1.03 | 1.40 | 11.8 | (3.7-31.8) |  |
| Hill Chhetri | 154 | 1.00 | 1.33 | 8.4 | (4.8-14.2) |  |
| Terai Brahmin/Chhetri | 13 | * | * | * | * |  |
| Other Terai caste | 46 | (0.84) | (1.43) | (21.1) | (12.0-34.4) |  |
| Hill Dalit | 103 | 1.04 | 1.37 | 5.4 | (2.6-11.2) | 0.001 |
| Terai Dalit | 27 | (0.85) | (1.65) | (26.1) | (13.0-45.4) | 0.001 |
| Newar | 19 | * | * | * | * |  |
| Hill Janajati | 156 | 0.99 | 1.42 | 9.7 | (6.6-14.0) |  |
| Terai Janajati | 63 | 1.10 | 1.35 | 3.2 | (1.0-9.6) |  |
| Muslim | 13 | * | * | * | * |  |
| Vitamin A supplement intake during mass campaign March 2016 |  |  |  |  |  |  |
| Yes | 610 | 0.97 | 1.43 | 12.6 | (9.6-16.4) | 0.987 |
| No | 46 | (0.98) | (1.42) | (12.0) | (4.8-26.7) | 0.987 |
| Baal Vita micronutrient powder intake during last 7 days |  |  |  |  |  |  |
| Yes | 6 | * | * | * | * | 0.316 |
| No | 652 | 0.97 | 1.43 | 12.6 | (9.8-16.1) | 0.316 |
| Total | 658 | 0.97 | 1.43 | 12.5 | (9.8-16.0) |  |
|  |  |  |  |  |  |  |
| Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |
| ${ }^{\text {a Whe }} 1996$ |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Includes those who have never attended school. |  |  |  |  |  |  |
| ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |
| ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 10 and more years of | hool. | School Leaving C | ficate. |  |  |  |

Annex 11.22: Inflammation Adjusted Geometric Mean Retinol and Retinol Deficiency Prevalence in Children 6-59 Months, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Retinol ${ }^{\text {b }} \mu \mathrm{mol} / \mathrm{L}$ |  | Retinol $\leq 0.7^{\text {a,b }} \mu \mathrm{mol} / \mathrm{L}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) | p-value |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 138 | 0.98 | 1.43 | 12.5 | (7.8-19.5) |  |
| Central | 125 | 0.96 | 1.46 | 13.0 | (8.4-19.4) |  |
| Western | 130 | 1.08 | 1.38 | 9.2 | (4.9-16.5) | 0.611 |
| Mid-western | 129 | 1.02 | 1.40 | 8.0 | (4.6-13.6) |  |
| Far-western | 135 | 1.03 | 1.41 | 9.5 | (5.8-15.2) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 106 | 1.09 | 1.31 | 4.9 | (1.8-12.9) |  |
| Hill | 276 | 1.04 | 1.40 | 8.7 | (6.3-11.9) | 0.039 |
| Terai | 275 | 0.95 | 1.45 | 14.1 | (10.1-19.5) |  |
| Location |  |  |  |  |  |  |
| Urban | 86 | 0.96 | 1.42 | 11.9 | (6.1-21.9) |  |
| Rural | 571 | 1.01 | 1.43 | 11.0 | (8.4-14.2) | 0.819 |
| Age, months |  |  |  |  |  |  |
| 6-8 | 8 | * | * | * | * |  |
| 9-11 | 23 | * | * | * | * |  |
| 12-17 | 49 | (0.98) | (1.44) | (15.8) | (6.5-33.6) |  |
| 18-23 | 53 | 1.13 | 1.34 | 1.6 | (0.4-6.8) | 0.038 |
| 24-35 | 155 | 1.02 | 1.41 | 11.6 | (7.1-18.4) |  |
| 36-47 | 186 | 1.03 | 1.43 | 8.2 | (4.7-13.9) |  |
| 48-59 | 183 | 0.95 | 1.45 | 15.2 | (10.3-21.9) |  |
| 6-23 | 133 | 1.01 | 1.41 | 9.3 | (4.8-17.2) |  |
| 24-59 | 524 | 1.00 | 1.43 | 11.6 | (8.9-15.0) | 0.439 |
| Sex |  |  |  |  |  |  |
| Male | 333 | 0.99 | 1.40 | 10.8 | (8.0-14.4) |  |
| Female | 324 | 1.01 | 1.46 | 11.4 | (7.7-16.6) | 0.832 |
| Maternal Education |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 84 | 0.94 | 1.47 | 13.3 | (6.2-26.3) |  |
| Primary ${ }^{\text {d }}$ | 74 | 1.03 | 1.43 | 8.8 | (4.7-15.8) |  |
| Some secondary ${ }^{\text {e }}$ | 94 | 1.09 | 1.36 | 7.5 | (2.3-22.0) | 0.668 |
| SLC and above ${ }^{\text {f }}$ | 106 | 1.02 | 1.41 | 9.4 | (4.8-17.6) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 163 | 0.97 | 1.52 | 14.3 | (10.3-19.4) |  |
| Second | 134 | 1.02 | 1.39 | 9.2 | (5.5-14.8) |  |
| Middle | 128 | 1.00 | 1.47 | 9.3 | (5.1-16.3) | 0.278 |
| Fourth | 122 | 1.00 | 1.43 | 14.8 | (8.1-25.4) |  |
| Highest | 110 | 1.00 | 1.32 | 8.3 | (4.5-14.8) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 65 | 1.06 | 1.39 | 8.5 | (3.3-20.3) |  |
| Hill Chhetri | 154 | 1.03 | 1.33 | 7.5 | (4.1-13.3) |  |
| Terai Brahmin/Chhetri | 13 | * | * | * | * |  |
| Other Terai caste | 45 | (0.87) | (1.42) | (18.8) | (11.6-29.0) |  |
| Hill Dalit | 103 | 1.07 | 1.38 | 5.4 | (2.6-11.2) | 0.001 |
| Terai Dalit | 26 | (0.88) | (1.65) | (25.3) | (13.3-42.9) | 0.001 |
| Newar | 19 | - | - | * | * |  |
| Hill Janajati | 156 | 1.01 | 1.42 | 9.1 | (6.0-13.4) |  |
| Terai Janajati | 63 | 1.12 | 1.36 | 2.4 | (0.6-9.0) |  |
| Muslim | 13 | * | * | * | * |  |
| Vitamin A supplement intake during mass campaign March 2016 |  |  |  |  |  |  |
| Yes | 609 | 1.00 | 1.43 |  | (8.6-14.4) |  |
| No | 46 | (1.00) | (1.42) | (10.9) | $(4.0-26.2)$ | 0.924 |
| Baal Vita micronutrient powder intake during last 7 days |  |  |  |  |  |  |
| Yes | 6 | * | * | * | * |  |
| No | 650 | 1.00 | 1.43 | 11.2 | (8.8-14.2) |  |
| Total | 657 | 1.00 | 1.43 | 11.1 | (8.7-14.1) |  |
|  |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |
| ${ }^{\text {a }}$ WHO, 1996 |  |  |  |  |  |  |
| ${ }^{\text {b }}$ Retinol adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted. |  |  |  |  |  |  |
| ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school. |  |  |  |  |  |  |
| ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school. |  |  |  |  |  |  |
| IIncludes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |

Annex 11.23: Geometric Mean Retinol and Retinol Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Retinol $\mu \mathrm{mol} / \mathrm{L}$ |  | Retinol $\leq 0.7^{\text {a }} \mu \mathrm{mol} / \mathrm{L}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 109 | 1.23 | 1.41 | 3.1 | (0.9-9.8) |  |
| Central | 106 | 1.20 | 1.47 | 8.9 | (5.3-14.6) |  |
| Western | 102 | 1.31 | 1.39 | 4.4 | (1.6-11.6) | 0.069 |
| Mid-western | 104 | 1.25 | 1.34 | 2.4 | (0.6-9.2) |  |
| Far-western | 108 | 1.23 | 1.37 | 2.4 | (0.7-7.8) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 89 | 1.34 | 1.39 | 0.1 | (0.0-0.5) |  |
| Hill | 217 | 1.36 | 1.38 | 2.5 | (1.1-5.5) | 0.010 |
| Terai | 223 | 1.13 | 1.42 | 8.1 | (5.2-12.5) |  |
| Location |  |  |  |  |  |  |
| Urban | 73 | 1.17 | 1.46 | 8.4 | (3.4-19.5) | 0220 |
| Rural | 456 | 1.25 | 1.41 | 4.7 | (3.1-7.2) | 0.220 |
| Age, years |  |  |  |  |  |  |
| 15-19 | 42 | (1.17) | (1.37) | (0.0) | - |  |
| 20-29 | 213 | 1.20 | 1.38 | 6.0 | (3.4-10.6) | 0.209 |
| 30-39 | 187 | 1.25 | 1.46 | 6.5 | (3.1-12.8) | 0.209 |
| 40-49 | 87 | 1.31 | 1.42 | 2.6 | (0.5-13.4) |  |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {b }}$ | 171 | 1.22 | 1.45 | 6.1 | (3.1-11.5) |  |
| Primary ${ }^{\text {c }}$ | 86 | 1.29 | 1.44 | 5.8 | (2.4-13.2) | . 822 |
| Some secondary ${ }^{\text {d }}$ | 131 | 1.25 | 1.42 | 5.1 | (1.9-12.9) | . 822 |
| SLC and above ${ }^{\text {e }}$ | 141 | 1.21 | 1.36 | 4.0 | (1.5-10.2) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 105 | 1.32 | 1.39 | 1.6 | (0.3-7.6) |  |
| Second | 121 | 1.17 | 1.41 | 6.1 | (3.2-11.3) |  |
| Middle | 94 | 1.26 | 1.42 | 5.1 | (3.2-8.1) | 0.590 |
| Fourth | 102 | 1.20 | 1.43 | 6.7 | (2.4-17.2) |  |
| Highest | 107 | 1.25 | 1.41 | 5.4 | (2.0-13.9) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 78 | 1.28 | 1.30 | 1.5 | (0.4-6.4) |  |
| Hill Chhetri | 123 | 1.29 | 1.42 | 3.0 | (1.0-8.1) |  |
| Terai Brahmin/Chhetri | 16 | , | * | * | (1.0.8) |  |
| Other Terai caste | 31 | (1.05) | (1.49) | (19.2) | (9.7-34.6) |  |
| Hill Dalit | 65 | 1.29 | 1.33 | 0.6 | (0.1-4.5) | <0.001 |
| Terai Dalit | 25 | (1.02) | (1.48) | (16.6) | (7.7-32.0) | <0.001 |
| Newar | 20 | * | * | * | * |  |
| Hill Janajati | 112 | 1.39 | 1.39 | 3.4 | (1.2-9.5) |  |
| Terai Janajati | 51 | 1.14 | 1.41 | 1.5 | (0.2-10.2) |  |
| Muslim | 6 | * | * | * | * |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 0 | * | * | * | * |  |
| No | 529 | 1.23 | 1.42 | 5.2 | (3.5-7.7) |  |
| Total | 529 | 1.23 | 1.42 | 5.2 | (3.5-7.7) |  |
| Note: N unweighted. All estimates account for weighting and complex sample design. |  |  |  |  |  |  |
| Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution. |  |  |  |  |  |  |
| An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. |  |  |  |  |  |  |
| Sample size might vary slightly due to missing data. |  |  |  |  |  |  |
| P-value obtained from Pearson's chi-square test. |  |  |  |  |  |  |
| ${ }^{\text {a }}$ WHO, 1996 |  |  |  |  |  |  |
| ${ }^{\text {'Includes those who have completed 0-5 years of school. }}$ |  |  |  |  |  |  |
| ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school. <br> ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate. |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Annex 11.24: Inflammation Adjusted Geometric Mean Retinol and Retinol Deficiency Prevalence in Non-Pregnant Women 15-49 Years, Nepal National Micronutrient Status Survey, 2016

| Characteristics | N | Retinol ${ }^{\text {b }} \mu \mathrm{mol} / \mathrm{L}$ |  | Retinol $\leq 0.7^{\text {a,b }} \mu \mathrm{mol} / \mathrm{L}$ |  | p-value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Geometric Mean | SD | \% | (95\% CI) |  |
| Developmental Region |  |  |  |  |  |  |
| Eastern | 109 | 1.26 | 1.40 | 3.1 | (0.9-9.8) |  |
| Central | 106 | 1.24 | 1.46 | 8.9 | (5.3-14.6) |  |
| Western | 101 | 1.34 | 1.39 | 4.4 | (1.6-11.7) | 0.070 |
| Mid-western | 104 | 1.28 | 1.35 | 2.4 | (0.6-9.2) |  |
| Far-western | 107 | 1.25 | 1.36 | 1.3 | (0.3-5.5) |  |
| Ecological Region |  |  |  |  |  |  |
| Mountain | 89 | 1.37 | 1.40 | 0.1 | (0.0-0.5) |  |
| Hill | 217 | 1.40 | 1.38 | 2.5 | (1.1-5.5) | 0.010 |
| Terai | 221 | 1.16 | 1.41 | 7.9 | (5.0-12.4) |  |
| Location |  |  |  |  |  |  |
| Urban | 72 | 1.20 | 1.46 | 8.4 | (3.4-19.6) | 0.184 |
| Rural | 455 | 1.28 | 1.41 | 4.6 | (3.0-7.1) | 0.184 |
| Age, years |  |  |  |  |  |  |
| 15-19 | 41 | (1.19) | (1.37) | (0.0) | - |  |
| 20-29 | 213 | 1.23 | 1.38 | 6.0 | (3.4-10.6) | 0.243 |
| 30-39 | 186 | 1.29 | 1.46 | 6.2 | (2.9-12.6) | 0.243 |
| 40-49 | 87 | 1.34 | 1.41 | 2.6 | (0.5-13.4) |  |
| Education |  |  |  |  |  |  |
| No education ${ }^{\text {c }}$ | 171 | 1.25 | 1.44 | 5.8 | (2.9-11.2) |  |
| Primary ${ }^{\text {d }}$ | 85 | 1.32 | 1.44 | 5.8 | (2.4-13.3) | 889 |
| Some secondary ${ }^{\text {e }}$ | 130 | 1.29 | 1.42 | 5.2 | (2.0-12.9) | 889 |
| SLC and above ${ }^{\text {f }}$ | 141 | 1.25 | 1.36 | 4.0 | (1.5-10.2) |  |
| Wealth Quintile |  |  |  |  |  |  |
| Lowest | 104 | 1.35 | 1.38 | 1.6 | (0.3-7.6) |  |
| Second | 121 | 1.20 | 1.41 | 5.5 | (2.8-10.7) |  |
| Middle | 94 | 1.29 | 1.42 | 5.1 | (3.2-8.1) | 0.631 |
| Fourth | 102 | 1.23 | 1.43 | 6.7 | (2.4-17.2) |  |
| Highest | 106 | 1.29 | 1.41 | 5.4 | (2.0-13.9) |  |
| Ethnicity |  |  |  |  |  |  |
| Hill Brahmin | 77 | 1.32 | 1.30 | 0.9 | (0.1-6.5) |  |
| Hill Chhetri | 123 | 1.32 | 1.42 | 3.0 | (1.0-8.1) |  |
| Terai Brahmin/Chhetri | 16 | * | * | * | * |  |
| Other Terai caste | 31 | (1.08) | (1.50) | 19.2 | (9.7-34.6) |  |
| Hill Dalit | 64 | 1.32 | 1.33 | 0.6 | (0.1-4.5) | <0.001 |
| Terai Dalit | 25 | (1.05) | (1.48) | 16.6 | (7.7-32.0) | <0.001 |
| Newar | 20 | * | - | * | * |  |
| Hill Janajati | 112 | 1.42 | 1.39 | 3.4 | (1.2-9.5) |  |
| Terai Janajati | 51 | 1.17 | 1.40 | 1.5 | (0.2-10.2) |  |
| Muslim | 6 | * | * | * | * |  |
| Vitamin A supplement intake last 24 hours |  |  |  |  |  |  |
| Yes | 0 | * | * | * | * |  |
| No | 527 | 1.27 | 1.41 | 5.1 | (3.4-7.6) |  |
| Total | 527 | 1.27 | 1.41 | 5.1 | (3.4-7.6) |  |

Note: N unweighted. All estimates account for weighting and complex sample design.
Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed
Sample size might vary slightly due to missing data.
P-value obtained from Pearson's chi-square test.
${ }^{\text {a }}$ WHO, 1996
${ }^{\text {b }}$ Retinol adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted. ${ }^{\text {c I Includes those who have never attended school. }}$
${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
${ }^{\text {e }}$ Includes those who have completed 6-9 years of school.
${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

# Annex 12: Person Involved in the Nepal National Micronutrient Status Survey, 2016 

## Technical and Administrative Staff of New ERA

Team Leader<br>Ms. Nira Joshi<br>Research Officer<br>Mr. Umesh Ghimire<br>Ms. Sandhya Sahi<br>Mr. Ramesh Dangi<br>Senior Technical Staff<br>Dr. Ramesh Kanta Adhikari<br>Dr. Udbodha Ushakar Rijal<br>Dr. Sudhamsu Koirala<br>Ms. Akriti Gyawali<br>Data Processing Staff<br>Ms. Ramita Shakya<br>Ms. Sarita Vaidya<br>Ms. Deepa Shakya<br>Mr. Babu Raja Dangol<br>Administrative Staff<br>Ms. Niru Shrestha<br>Mr. Sujan Bhakta Shrestha<br>Mr. Kishor Shrestha<br>Mr. Rajendra Kumar Shrestha<br>Report Formating<br>Mr. Sanu Raja Shakya

Quality Control Staff
Mr. Kamal Timsina
Mr. Manoj Bikram Kathet
Mr. Durga Prasd Acharya
Mr. Himalaya Awasti
Mr. Hari Bhakta Saud

Field Supervisors
Mr. Dambar Bahadur Tamang
Mr. Khadkaraj Kharel
Mr. Bishnu Kant Gautam
Mr. Pushpa Raj Lama
Mr. Satish Rayamajhi
Mr. Bishwas Neupane
Mr. Shaligram Gautam
Mr. Devendra Ghimire
Mr. Shankar Prasad Neupane
Mr. Dinesh Marahatta
Mr. Ashok Pandeya
Mr. Shiva Hari Ghimire
Mr. Chitra Neupane
Mr. Bhim Prd. Neupane
Laboratory Coordinators
Mr. Binod Basnet
Mr. Man Bahadur Gharti Magar
Mr. Md. Sajid Ali
Mr. Min Bahadur Katuwal
Mr. Pankaj Kumar Deo
Mr. Sudeep Maharjan
Mr. Suman Maharjan
Ms. Luna Maharjan
Ms. Pratima Paudel
Ms. Pritima Shrestha
Ms. Reeta Devi Dulal
Ms. Smita Lakhe
Ms. Suku Lama
Ms. Yasodha Bhatta

## Field Inteviewers

Ms. Babita Bhattarai
Ms. Samiksha Rijal
Ms. Puspa Devi Lingden
Ms. Yamuna Karki
Ms. Upama Karanjit
Ms. Daya Kumari Tamang
Ms. Renuka Lingthep
Ms. Babita Mahato
Ms. Akriti Shrestha
Ms. Puja Baraili
Ms. Benu Gurung
Ms. Munni Gurung

Ms. Mina Adhikari
Ms. Dil Kumari Thapa
Ms. Rinku Kumari Yadav
Ms. Sapana Gautam
Ms. Bisna Rai
Ms. Jyoti Khapangi
Ms. Sushila Khadka
Ms. Anju Kumari Karn
Ms. Sarita Shrestha
Ms. Ranjana Mainali
Ms. Asha Tamang
Ms. Salina Shah
Ms. Pranita Koirala
Ms. Babita Paneru
Ms. Jyoti Adhikari
Ms. Arisha K.C.
Ms. Kalpana Dhungana
Ms. Rajani Basnet
Ms. Krispa Pyakurel
Ms. Rina Rai
Ms. Tara Karki
Ms. Babita Joshi
Ms. Karuna Siwakoti
Ms. Pramila Bista
Ms. Rima Thapa
Ms. Namita Dhaugoda
Ms. Sadhana Simkhada
Ms. Tulasi Prasain
Ms. Sadhana Shrestha
Ms. Laxmi Thapaliya
Ms. Bindu Khadka
Ms. Ram Maya Thapaliya
Ms. Tirtha Maya Rai
Ms. Hukum Kumari Adhikari
Ms. Ishwori Rijal
Ms. Sangita Regmi
Ms. Krishna Chaudhary
Ms. Usha Bhandari
Ms. Ranju K.C.
Ms. Jamuna Chaudhary
Ms. Kirti Gautam
Ms. Anju Shrestha
Ms. Tara Shrestha
Ms. Rojina Neupane
Ms. Sumitra Panday
Ms. Sadhana Neupane
Ms. Pratima Siwakoti
Ms. Sarala Dahal
Ms. Neelima Upadhyay
Ms. Rojeena Shrestha
Ms. Ranjana Adhikari
Ms. Mina Maya Pakharin
Ms. Khageswori Dhant

## Phlebotomists

Ms. Nabina Karki
Ms. Sajana Shrestha
Ms. Rashmi Bhattarai
Ms. Yojana Kumari Shah
Ms. Sushma Pokharel
Ms. Nabina Gurung
Ms. Buna Karkee
Ms. Anjana Ghale
Ms. Susmita Gurung
Ms. Sabi Shrestha
Ms. Sangita Maharjan
Ms. Pooja Tripathi
Ms. Namrata Dhungana
Ms. Babita Bhandari
Ms. Bimla Shrestha
Ms. Dikshya Acharya
Ms. Rajani Khatri
Ms. Nistha Thapa
Ms. Tripti Sharma
Ms. Sandhya Bhandari
Ms. Shabbu Shrestha
Ms. Samita Dhungana
Ms. Trishna Rayamajhi
Ms. Sangita Shrestha
Ms. Laxmi Gautam
Ms. Roshni Thapa Magar
Ms. Alisha Pokharel
Ms. Pramila Shrestha
Ms. Sushma Pariyar
Ms. Asmita Lamichhane
Ms. Reshma Shrestha

Laboratory Technicians
Mr. Aashik Kila Shrestha
Mr. Ajay Sekhar Lawa
Mr. Amrit Pudasaini
Mr. Bipin Sharma Timalsina
Mr. Biplab Bhattarai
Mr. Dipesh Kumar Yadav
Mr. Krishna Prasad Chaulagain
Mr. Nabaraj Thapa Magar
Mr. Niran Bade
Mr. Pasang Tsiring Sherpa
Mr. Prabin Chaudhary
Mr. Prabin Mehar Kayastha
Mr. Ramesh Bahadur Shahi
Mr. Sudarshan Pandey
Ms. Amrita Ghimire
Ms. Anita Lamichhane
Ms. Anita Maharjan
Ms. Arati Simkhada
Ms. Archana Chaulagain

| Ms. Bina Basyal | Sample Transpoters | Mr. Rajendra Bahadur Chand |
| :--- | :--- | :--- |
| Ms. Kabita Singh | Mr. Devendra Pokhrel | Mr. Pratik Devkota |
| Ms. Kopila Paudel | Mr. Bhanu Bhakta Dhakal | Mr. Kamal Prasad Acharya |
| Ms. Narmada Khanal | Mr. Raj Kumar Tamang | Mr. Deepak Panthi |
| Ms. Radha K.P. | Mr. Netra Bikram Thapa | Mr. Sanjaya Dangi |
| Ms. Rama Giri | Mr. Pralhad Neupane | Mr. Krishna Prakash Sharma |
| Ms. Sanjita Khanal | Mr. Dev Raj Nepal | Mr. Laxmi Datt Pandey |
| Ms. Saveena Raut | Mr. Kishor Kumar Chapagain | Mr. Kiran Chaudhary |
| Ms. Shanti Khanal | Mr. Ashish Shrestha | Mr. Ghanashyam Naunyal |
|  | Mr. Bhuwan Sapkota | Mr. Hem Prasad Joshi |
|  | Mr. Sushil Ghimire | Mr. Ramesh Khanal |

## Questionnaire

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Consent - for Household Head (Aged 18+ years) or Another Adult (Aged 18+ years) in the household responsible for (or knowledgeable about) purchasing household foods

Namaste! My name is $\qquad$ I am here from (name of survey organization) to collect the data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions about your household and the foods your family purchases and eats. We will also ask for small samples (2 to 3 tablespoons each) of salt and wheat flour from your household. The food samples will be analysed later to learn about the vitamin and minerals in those foods. We may also randomly select people in your household to participate in additional interviews that would include completing additional questionnaires, and possibly measuring height and weight, or possibly collecting blood, urine or stool samples. If an additional person in your household is selected for additional interviews, then we will explain in detail what that would involve and get consent for each of those additional interviews.

There is low risk if your household participates in this survey. There is a small chance that some of the questions we ask might cause emotional discomfort or distress. If there are questions that you are not comfortable with, you are free to refuse to answer. Before the team leaves your house, they will give you the contact details of the survey manager. You can use these contacts to talk about any problems or questions you might have with taking part in this study.

For participating in this survey, your household will receive replacements for the salt and wheat flour samples that are collected, as well as a shawl, towel, toothpaste, toothbrush, soap and nail cutter. If you participate in the survey, you will not directly benefit for taking part in this household interview survey. If another member of your household is randomly selected to participate in one of the additional interviews, then they might benefit from getting the results
of certain tests carried out in the household, such as knowing their height and weight, or if they have anemia or malaria.

We will add the information you give us to that of other participants in the survey and create a report. This report will tell us about the health and nutrition of people in Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to you or others in your household, and all of the results will be shown in the report for the entire group.

Remember that you do not have to be in this survey. You can choose if you want to volunteer. You can also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Consent - for Household Head (Aged 18+ years) or Another Adult (Aged 18+ years) in the household responsible for (or knowledgeable about) purchasing household foods

## Please complete this form after you have read the information sheet to the targeted participant

Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)
Thank you for your interest in taking part of the NNMSS. Before you agree to take part, we must explain the survey project to you.

If you have any questions arising from the explanation already given to you, please ask questions to help you decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

## Participant's Statement

I $\qquad$

- have read/listened to the notes written above and the Information Sheet, and understand what thesurvey involves.
- understand that if I decide at any time that I no longer wish to take part in this survey, I can stop at any time and withdraw immediately.
- agree to have my personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree to take part in this survey.
- understand that the information will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify me from any publications.
- am assured that the confidentiality of my personal information will be upheld by not including the name or any other identifying information.
Signed:
Participant's Name:

$\qquad$
Date:Participant's Age:
$\qquad$ Years
Signed:Date:Witness Name:
$\qquad$ (If participant is illiterate)

Signed:
Date:
Field Researcher $\qquad$ (this will be done immediately at the field)

| Name: | Post: |
| :--- | :--- |
| Signed: | Date: |

One of the Co-Investigator of the Research Study. $\qquad$ (this will be done later on)
Name:
Post:
Signed:
Date:

A021. Language used in the interviewer

01 Nepali
96 Other (specify) $\qquad$
A022. Field supervisor

A023. First data entry $\qquad$
A024. Second data entry


Label

|  | B. HOUSING |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| B001 | What is the main source of drinking wáter for members of your household? | Piped water <br> Piped into dwelling $\qquad$ 11 <br> Piped to yard/plot $\qquad$ .12 <br> Piped in neighbour $\qquad$ .13 <br> Public tap/standpipe $\qquad$ 14 <br> Tubewell or borehold dug well...................... 21 <br> Water from well <br> Water from spring | B004 |
| B002 | Where is that water source located? | In own dwelling ................................................................................................................................................................. | $\} \text { B004 }$ |
| B003 | How long does it take to get there, get water, and come back? |  |  |
| B004 | Do you do anything to the water to make it safer to drink? |  | $\rightarrow$ B006 |
| B005 | What do you usually do to make the water safer to drink? <br> Anything else? <br> Record all mentioned |  |  |
| B006 | What kind of toilet facility do members of your household usually use? <br> Observe and circle the answer |  |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| B007 | Does your household have: <br> READ RESPONSES ALOUD AND RECORD ALL MENTIONED |  |  |
| B008 | What type of fuel does your household mainly use for cooking? |  |  |
| B009 | Do you have a seperate room which is used as a kitchen? | Yes ......................................................................................................................... 2 No ........ |  |
| B010 | Main material of the floor. <br> Make a note of what you observe |  |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| B011 | Main material of the roof. <br> Make a note of what you observe |  |  |
| B012 | Main material of the exterior walls. <br> Make a note of what you observe |  |  |
| B013 | How many rooms in this household are used for sleeping? | No. Of rooms. $\qquad$ $\square$ $\square$ |  |
| B014 | Does any member of this household own: <br> Read responses aloud and record all mentioned |  |  |
| B015 | Does any member of this household own any agricultural land? | Yes............................................................................................................................... 1 No 1 | $\rightarrow$ B017 |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| B016 | How many bigha/rhopani of agricultural land do members of this household own? <br> If 95 or more, circle ' 995 ' <br> Write 01 if 10 or more kattha <br> Write 01 if 8 or more aana <br> Circle 95 if 95 or more kattha/ aanA | Bigha .................................. $1 \square \square$ Ropani ................................. $2 \square \square$ If 95 or more kattha/aana Don't know............................................... 98 |  |
| B017 | Does this household own any livestock, herds of other farm animals, or poultry? | Yes................................................................................................................................. 12 No $1 . . . .$. | $\rightarrow$ B019 |
| B018 | How many of the following animals/birds does this household own? <br> If none, enter ' 00 ' <br> If 95 or more, enter '95' | A) Buffalo <br> B) Milk Cows or Bulls. <br> C) Horses, Donkeys, or Mules $\qquad$ $\square$ $\square$ <br> D) Goats $\qquad$ $\square$ $\square$ <br> E) Sheep $\qquad$ $\square$ $\square$ <br> F) Chickens $\qquad$ $\square$ $\square$ <br> G) Ducks $\qquad$ $\square$ $\square$ <br> H) Pigs. $\qquad$ $\square$ $\square$ <br> I) Yaks $\qquad$ $\square$ $\square$ |  |
| B019 | Does your household have any mosquito nets that can be used while sleeping? |  | $\rightarrow \mathrm{B} 021$ |
| B020 | How many mosquito nets does your household have? | No. Of nets $\qquad$ $\square$ $\square$ |  |
| B021 | At any time in the past 12 months, has anyone come into your dwelling to spray the interior walls against mosquitos? |  | $\begin{aligned} & \rightarrow \mathrm{B} 023 \\ & \rightarrow \mathrm{~B} 023 \end{aligned}$ |
| B022 | Who sprayed the dwelling? <br> Record all mentioned |  |  |
| B023 | Please show me where members of your household most often wash their hands. | Observed ............................................................. 1 Not observed, not in dwelling/yard/plot........... 3 Not observed, no permission to see............. 3 Not observed, other reason ........................ 4 |  |
| B024 | Observation only Observe presence of water at the place for handwashing | Water is available...................................................................... 2 |  |
| B025 | Observation only <br> Observe presence of soap, detergent, or other cleansing agent | Soap or detergent <br> (bar, liquid, powder, paste) $\qquad$ <br> Ash, mud, sand.................................................. 2 <br> None $\qquad$ |  |


|  | C. HOUSEHOLD FOOD SECURITY |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| C001 | In the past 12 months, how frequently did you worry that your household would not have enough food? |  |  |
| C002 | In the past 12 months, how often were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? |  |  |
| C003 | In the past 12 months, how often did you or any household member have to eat a limited variety of foods due to a lack of resources? |  |  |
| C004 | In the past 12 months, how often did you or any household member have to eat some food that you really did not want to eat because of a lack of resources to obtain other types of food? |  |  |
| C005 | In the past 12 months, how often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? |  |  |
| C006 | In the past 12 months, how often did you or any household member eat fewer meals in a day because of lack of resources to get food? |  |  |
| C007 | In the past 12 months, how often was there no food to eat of any kind in your household because of lack of resources to get food? |  |  |
| C008 | In the past 12 months, how often did you or any household member go to sleep at night hungry because there was not enough food? |  |  |
| C009 | In the past 12 months, how often did you or any household member go a whole day and night without eating anything because there was not enough food? | Never ......................................................................................................................................................................................................................................... Rarely Sometimes Often............ |  |
|  | CHECK Qs. C001-C009 <br> All code '1' not circled | All code '1' circled $\quad \square \rightarrow$ D001 |  |
| C010 | Did your household have to adopt the following to meet the household food need in the last 12 months? <br> Read responses aloud and record all mentioned |  |  |


|  | D. SHOCK EXPOSURE AND SEVERITY |  |
| :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE ${ }^{\text {SKIP TO }}$ |
| D001 | Did your household experience earthquake in April 2015? |  |
| D002 | What were the main impacts to your household of the earthquake in April 2015? <br> Do not read responses aloud. <br> Multiple answers apply. |  |
| D003 | From whom, if anyone, did your household receive assistance to cope with the impact of the earthquake in April 2015? <br> Do not read responses aloud. <br> Multiple answers apply. |  |
| D004 | What type of assistance did your household receive? <br> Do not read responses aloud. <br> Multiple answers apply. |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| D005 | In the months following the shock, how severe was the impact of the earthquake on your household Income? <br> Read response options aloud. | Remained the same .................................................................................................................................................... |  |
| D006 | In the months following the earthquake, how severe was the impact on household food consumption? <br> Read response options aloud. |  |  |
| D007 | To what extent has your household's ability to meet food needs returned to the level it was before the April 2015 earthquake? <br> [PROMPT] | Ability to meet food needs is: <br> The same as before the shock $\qquad$ <br> Better than before the shock $\qquad$ <br> Worse than before the shock. $\qquad$ |  |
| D008 | In light of the shocks and stressors of the earthquakie that your household faced, to what extent do you believe your household will be able to meet its food needs in the next year? <br> [PROMPT] | Ability to meet food needs will be: <br> The same as before the shock $\qquad$ <br> Better than before the shock $\qquad$ <br> Worse than before the shock. $\qquad$ |  |


|  | SHOCK EXPOSURE AND SEVERITY-NON EARTHQUAKE |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| D009 | Did your household experience other shocks (other than the April 2015 earthquake) during the past 12 months? | Yes............................................................................................................................ 12 | $\rightarrow \underset{(\text { E0c. E) }}{\mathrm{E} 001}$ |
| D010 | What were the main shocks that your household experienced during the past 12 months <br> Multiple answers apply. |  |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| D011 | What were the main impacts to your household? <br> Do not read responses aloud. <br> Multiple answers apply. |  |  |
| D012 | From whom, if anyone, did your household receive assistance to cope with the impact of the shock? <br> Do not read responses aloud. <br> Multiple answers apply. |  | $\rightarrow \text { D014 }$ |
| D013 | What type of assistance did your household receive? <br> Do not read responses aloud. <br> Multiple answers apply. |  |  |
| D014 | In the months following the shock, how severe was the impact on your household income? <br> Read response options aloud. | Better than before............................................. 1 Remained the same ...................................................................................................................................................... |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| D015 | In the months following the shock, how severe was the impact on household food consumption? <br> Read response options aloud. | Better than before............................................. 1 Remained the same .................................................................................................................................. 4 |  |
| D016 | To what extent has your household's ability to meet food needs returned to the level it was before the shock? <br> [PROMPT] | Ability to meet food needs is: <br> The same as before the shock $\qquad$ <br> Better than before the shock $\qquad$ <br> Worse than before the shock. $\qquad$ |  |
| D017 | In light of the shocks and stressors that your household faced, to what extent do you believe your household will be able to meet its food needs in the next year? <br> [PROMPT] | Ability to meet food needs will be: <br> The same as before the shock $\qquad$ <br> Better than before the shock $\qquad$ <br> Worse than before the shock. $\qquad$ |  |





\begin{tabular}{|c|c|c|c|c|}
\hline Q.No. \& Questions and Filters \& Crystal Salt (Phoda) (A) \& Refined Salt (B) \& Crushed Salt (C) \\
\hline E015.1 \& What kind of flour do you usually use at home? \&  \&  \& \\
\hline \& \& Maida Purchased
(Roller Mill Refined Wheat Flour - Low
Extraction Flour)
(A) \& Atta Purchased
(Roller Mills With Chakki Lines - Whole
Wheat Flour Or From Commercial
Chakki Mills- High Extraction Flour)
(B) \& \begin{tabular}{l}
Pitho / Atta Locally Grown (Grown At Homeor Locally Produced From Small Chakki Mills Whole Wheat Flour) \\
(C)
\end{tabular} \\
\hline E016 \& Can you show me the ____ flour
you have \&  \& Yes .....................................................................................................
(if '2' skip to next column) \& \\
\hline E017 \& \begin{tabular}{l}
Oberve the packaging. \\
Is it in the original \\
Packaging ?
\end{tabular} \& Yes ...................................................................................................................
(if '2' skip to next column) \& Yes.................................................. 1
No ....................................................... 2

(if '2' skip to E20) \& <br>
\hline
\end{tabular}

| Q.No. | Questions and Filters | Crystal Salt (Phoda) (A) | Refined Salt (B) | Crushed Salt (C) |
| :---: | :---: | :---: | :---: | :---: |
| E018 | Oberve the brand name, make a note of it, and the country of origin. <br> Note: brand name for wheat flour include. |  | no brand $\qquad$ Skip to another brand <br> National brand.............................. 2 <br> Imported brand............................. 3 <br> A. Brand name <br> Gyan. $\qquad$ Hulas ............................................ 2 <br> Sakshuam...................................... 3 <br> Om ............................................... 4 <br> Jagadamba..................................... 5 <br> Other (specify) <br> B. Country of origin <br> Nepal. <br> India. $\qquad$ $\qquad$ <br> Other (specify) $\qquad$ $\qquad$ 96 1 96 |  |
| E019 | $\qquad$ <br> Label says fortified or enriched with iron, folic acid, vitamin a Only by observation |  |  |  |
| E020 | If you use more than one type of wheat your household? | flour, which type is the one used most in |  | ..........................$~$ ................$~$ .3 ...........................$~$ $4 \rightarrow$ E02 E 02 |
| E021 | Collect the sample of the most used type (purchased maida or purchased atta) <br> Review the responses to question \# E0 To verify if they have the most used type Replace with a packet of flour as a gift. | e of centrally milled wheat flour <br> 20 <br> of flour in the house and ask for a sample. | Sample collected $\qquad$ <br> Sample not collected - refused $\qquad$ Sample not collected insufficient quantity | ............................... 1 <br> . .2 <br> .3 |


|  | C. FORTIFIED FOODS - NOODLES |  |  |
| :---: | :---: | :---: | :---: |
| Q.No. | QUESTIONS AND FILTERS | CATEGORIES AND CODES | GO TO |
| E022 | Do people eat noodles in your household either in your house or when outside of your house? | Yes.......................................................................................................................... no | E029 |
| E023 | In general, how much and how often do you buy noodles in your house? <br> (Emphasize that it is what is purchased for all members of the household) | Note the quantity of noodles that are purchased each time <br> Packets $\square$ <br> Every $\qquad$ days $\qquad$ 1 $\square$ <br> Every $\qquad$ months. $\qquad$ $\square$ |  |
| E023.1 | What kind of noodles do you unually buy for your household |  |  |
| E024 | Do you have noodles in your house now? | Yes............................................................................................................................................................ no | E029 |
| E025 | Can you show me the noodles you have? | Yes..................................................................................................................... | E029 |
| E026 | Oberve the packaging. Is it in the original packaging? | Yes............................................................................................................................ | E029 |
| E027 | Observe the brand name, make a note of it, and the country of origin <br> Note: brand names for noodles Include. |  |  |
| E028 | $\qquad$ Label says fortified or enriched with iron <br> Only by observation. | Yes............................................................... 1 <br> No ................................................................... 2 <br> There is no label ............................................ 3 |  |


|  | FORTIFIED FOODS - EDIBLE OIL |  |
| :---: | :---: | :---: |
| Q.No. | QUESTIONS AND FILTERS | CATEGORIES AND CODES GO TO $^{\text {Cr }}$ |
| E029 | Does your household use cooking oil to prepare food or add to food? | YES................................................................................................................................... 23 NO......... |
| E030 | What is the MAIN TYPE of cooking $\underline{\text { oil t that is }}$ used in your household for most meals on most days? |  |
| E031 | In general, how much and how often do you buy (main type of) oil in your house? <br> (Emphasize that it is what is purchased for all members of the household) <br> If do not purchase oil, then put 0000 for a. Quantity and skip b. Unit of quantity | Note the quantity of oil that is purchased each time |
| E031.1 | What is the MAIN TYPE of cooking oil that your household buys? |  |
| E032 | Do you have this main cooking oil in your house right now? |  |
| E033 | Con you show me this main cooking oil? |  |
| E034 | (If main oil type is available): <br> When your household got this [main oil type], where did you get it from? <br> (if main oil type is not available): The last time your household got [main oil type], where did you get it from? <br> (circle only one answer.) |  |


| Q.No. | QUESTIONS AND FILTERS | CATEGORIES AND CODES | GO TO |
| :---: | :---: | :---: | :---: |
| E035 | (If main oil type is available): <br> When your household got this [main oil type], in what what type of container was it purchased? <br> (if main oil type is not available): <br> The last time your household got [main oil type], in what type of container was it purchased? <br> (read all response options) <br> (circle only one answer.) |  | $\begin{aligned} & >\mathrm{E} 038 \\ & >\mathrm{E} 038 \end{aligned}$ |
| E036 | Observe the packaging. Is it in the original packaging? | Yes.................................................................................................................... 12 no | E038 |
| E037 | Observe the brand name, make a note of it, and the country of origin <br> Need list of brand names |  | E038 |


|  | FORTIFIED FOODS - RICE |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | FOLLOW THE QUESTIONS IN VERTICLE FORMAT, NOTING THE RESPONSES FOR EACH TYPE OF FOOD IN THE CORRESPONDING COLUMN |  |  |  |
|  | QUESTIONS AND FILTERS | CATEGORIES AND CODES |  |  |
| Q.No. |  | Home produced Rice (A) (Pounded rice) | Small local milled Rice (B) | Rice from commercial/large scale mill (industrial rice) (C) |
| E038 | There are different types of rice. Which types of rice do you use in your household? <br> ASK ABOUT ALL THE OPTIONS | Yes..................................................... 1 No .................................................. 2 (if '2' skip to next column) | Yes ..................................................... 1 No.................................................. 2 (if '2' skip to next column) | Yes, from\ commercial/large scale mill (industrial rice). <br> No. $\qquad$ $\qquad$ Don't know, purchased from market and unsure....................... 98 <br> (if '2' skip to E045) |
| E038.1 | When your housejold consumes (Type of rice), do you consume it yearound or only seasonally? | Year round................................................................................... Seasonally....... | Year round........................................................................................ Seasonally....... | Year round....................................................................................... Seasonally ........ |
| E039 | In general, how much and how often do you buy $\qquad$ rice in your house? <br> (Emphasize that it is what is purchased for all members of the household. For those who only buy seasonally, this refers to when there are buying during |  | Note the quantity of small locally milled rice that is purchased each time If the household does not buy rice then note 000 | Note the quantity of small locally milled rice that is purchased each time If the household does not buy rice then note 000 $\text { K.g. } \square \square \square, \square$ |
|  | that season) |  | Every <br> Every $\qquad$ $\qquad$ days month $\qquad$ $\qquad$ 1 $\square$ $\square$ $\square$ $\square$ | Every <br> Every $\qquad$ $\qquad$ days month $\qquad$ 2 $\square$ |
| E040 | The last time you purchased packaged? $\qquad$ rice, how was it |  | Original manufacturer’s package.......... 1Dispensed into my own containerAt vendor's outlet............................. 2I do not purchase, it'selfproduced ...... 3Other (Specify), .... 96Don't know/remember...................... 98 <br> (If '3' skip to next column) | Original manufacturer's package.. 1 <br> Dispensed into my own container <br> At vendor's outlet.......................... 2 <br> I do not purchase, it'selfproduced .... 3 <br> (If '3' skip to E045) <br> Other (Specify) $\qquad$ <br> Don't know/remember $\qquad$ .96 98 |
| E041 | Do you have ___ rice in your house now? | Yes................................................................................................................. (if '2' skip to next column) | Yes ....................................................... 1 No............................................................. 2 (if '2' skip to next column) | Yes ......................................................................................................................... (if '2' skip to E045) |
| E042 | Can you show me the ___ rice you have? | Yes................................................................................................................. (if '2' skip to next column) | Yes ........................................................................................................................ (if '2' skip to next column) | Yes ....................................................................................................................... (if '2' skip to E045) |


| Q.No. | QUESTIONS AND FILTERS | CATEGORIES AND CODES |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Home produced Rice (A) (Pounded rice) | Small local milled Rice (B) | Rice from commercial/large scale mill (industrial rice) (C) |
| E043 | Observe the packaging of the rice. <br> Is it in the original packaging? |  | Yes ................................................................................................. 1 <br> (if '2' skip to next column) | Yes ....................................................................................................................... (if '2' skip to E045) |
| E044 | Observe the brand name, make a note of it, and the country of origin. |  |  |  |


|  | C. FORTIFIED FOODS - BISCUITS/COOKIES |  |  |
| :---: | :---: | :---: | :---: |
| Q.No. | QUESTIONS AND FILTERS | CATEGORIES AND CODES | GO TO |
| E045 | Do people eat biscuits/cookies in your household either in your house or when outside of your house? | Yes ................................................................ 1 No ..................................................................... 2 (if answer is '2', end of this section) |  |
| E046 | In general, how much and how often do you buy biscuits/cookies in your house? <br> (Emphasize that it is what is purchased for all members of the household) | Note the quantity of biscuits or cookies that are purchased each time |  |
| E047 | Do you have biscuits/cookies in your house now? | Yes $\qquad$ <br> No $\qquad$ <br> (if answer is ' 2 ', end of this section) |  |
| E048 | Can you show me the biscuits/cookies you have? | Yes ............................................................... 1 No ..................................................................... 2 (if answer is '2', end of this section) |  |
| E049 | Observe the packaging. Is it in the original packaging? | Yes $\qquad$ <br> No $\qquad$ <br> (if answer is ' 2 ', end of this section) |  |
| E050 | Observe the brand name, make a note of it, and the country of origin <br> Note: brand names for biscuits/cookies Include. | No brand ................................................................................................................................................... National brand...... Imported brand...... <br> A. Brand name: |  |
| E051 | $\qquad$ Label says fortified or enriched with iron <br> Only by observation. | Yes $\qquad$ <br> No $\qquad$ <br> There is no label $\qquad$ |  |

Interview End time: Hour $\square \square$ Minutes $\square \square$

End of household interview.

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Proxy Consent -for Children 6 to 59 Months

Namaste! My name is $\qquad$ I am here from (name of survey organization) to collect data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions about your child 6-59 months of age. We will also ask to measure your child's height and weight and to collect three small tubes of blood (equal to about 1 teaspoon each) from a vein in your child's arm. The test uses disposable new instruments that are clean and safe. We will use this blood to tell you during this visit if your child has anemia, malaria or Visceral leishmaniasis (Kala-azar).The rest of the blood will be analysed later to learn about the causes of anemia and vitamin and mineral status among young children in Nepal.

We will also ask to leave a container with you overnight in order to collect a small stool sample (equal to a few tablespoons) from your child 6-59 months that will be tested for helminths (worms) and other bacteria. We would very much appreciate your participation in this survey. For most participants, this survey will take about 1.5 hours to complete.

For some children(about 4out of 12),we will also ask them to take part in a special test for vitamin A that lasts about 4 hours. If your child is chosen for this test, after the child gives blood then we will give him/her a few drops of vegetable oil mixed well with a few drops of vitamin A. After 4 hours, the team will return to your house to collect blood (equal to about 1 teaspoon) into a small tube from a vein in your child's arm. This blood is used to confirm the results of the vitamin A test from the blood collected earlier in the day.

There is low risk if your child participates in this survey. There is a small chance that some of the questions we ask or being asked to give a stool sample might cause emotional discomfort or distress. If there are questions that you are not comfortable with, you are free to refuse to answer and you can refuse for your child to give the blood or stool samples. There is a small chance that your child may have some physical discomfort from the needle used to collect blood. Only trained staff persons specialized in blood collection will collect the blood. There will only be at most two attempts to collect the blood. Health problems that result from taking part in a survey like this are rare. Before the team leaves your house, they will give you the contact details for your local health clinic. They will also give you the contact details of the survey manager. You can use these contacts to talk about any problems or questions you might have with your child taking part in this survey.

For participating in this survey, your household will receive a shawl, towel, toothpaste, toothbrush, soap and nail cutter.If you are selected for the special vitamin A test that takes approximately 4 hours, then you will also get a blanket. If your child participates in the survey, the benefit to your child for taking part in this survey is that you will get your child's results for height, weight, anemia, malaria, and Visceral leishmaniasis (Kala-azar).The information you give us with the questions and other tests from the blood and stool will not directly benefit your child. We will add the information from your child to that of other participants in the survey and create a report. This report will tell us about the health and nutrition of young children in

Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your child's name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to your child and all of the results will be shown in the report for the entire group.

Remember that your child does not have to be in this survey. You can choose if you want your child to volunteer. Your child can also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

> Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Proxy Consent - for Children 6 to 59 Months

Please complete this form after you have read the information sheet to the targeted participant

Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)
"Thank you for your interest in having your child takes part in the NNMSS. Before you agree to have your child take part, we must explain the survey project to you (participant's parent/legal guardian).

If you (participant's parent/legal guardian) have any questions arising from the explanation already given to you, please ask questions to help you to decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

On behalf of Participant's Statement
(mention child's name)
I $\qquad$ (mention the name of participant's parent/legal guardian)

- have read/listened to the notes written above and the explanation, and understand what the survey involves.
- understand that if I decide at any time that I no longer wish for (mention child's name) to take part in this project, I can stop at any time and withdraw immediately.
- agree to have my child's personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree for my child to take part in this survey.
- understand that the information from my child will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify my child from any publications.
- am assured that the confidentiality of my child's personal data will be upheld by not including the name or any other identifying information.
$\qquad$ Child's Age: $\overline{\text { YYYY } / M M}$
Child's mother/caretakers' name: $\qquad$ Age: $\qquad$ (years)
Signed:
Date: $\qquad$ $/ \overline{\mathrm{MM}} /{ }^{\prime} \overline{\mathrm{DD}}$

Witness Name: $\qquad$ (If participant is illiterate)
Signed: Date:

Field Researcher $\qquad$ (this will be done immediately at the field)
Name:
Post:
Signed:
Date:
One of the Co-Investigator of the Research Study.................. (this will be done later on)
Name:
$\begin{array}{ll}\text { Signed: } & \text { Post: } \\ \end{array}$

LABEL OF
CHILD
UCQUESXXXX
NEPAL NATIONAL MICRONUTRIENT STATUS SURVEY - 2072/73
QUESTIONNAIRE FOR CHILD 6 TO 59 MONTHS (MOTHERICAREGIVER IS RESPONDENT)



| I. GENERAL CHARACTERISTICS OF THE CHILD |  |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| I023 | On what day, month and year was the child [Name] born? <br> If the informant does not remember, ask him/her for the birth certificate of the child. |  |  |
| I024 | Calculate the age and confirm the DOB. <br> Write completed age in months. Check withI023 | Years.......................................... |  |
| **If The Age Of The Child Is Less Than 6 Months Or 5 Years Or More, Stop The Interview And Select Another Child*** |  |  |  |


| J. CHILD DIET/FEEDING |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE |  | SKIP TO |
| J001 | How long has it been since the child (NAME) last ate or drank anything other than water? | 1. Minutes. |  |  |
| Check age in i023, children older than 24 months (2 years), skip to J013. |  |  |  |  |
| J002 | Did a health care worker or FCHV ever talk to you about how to feed the child (NAME) BEFORE the child (NAME) was born when you were pregnant? | Yes, health work $\qquad$ <br> Yes, FCHV $\qquad$ <br> Yes, BOTH health worker and <br> No. $\qquad$ <br> DON'T KNOW $\qquad$ | .............. 1 <br> .............. 2 <br> FCHV... 3 <br> ..............$~$${ }^{4}$. |  |
| J003 | Did a health care worker or FCHV ever talk to you about how to feed the child (NAME) AFTER the child (NAME) was born? | Yes, health work $\qquad$ <br> Yes, FCHV $\qquad$ <br> Yes, BOTH health worker and <br> No. $\qquad$ <br> Don't know $\qquad$ | .............$~$ <br>  <br> FCHV........... 2 <br> FCH....... 4 <br> ...........$~$ |  |
| J004 | Has the child (NAME) ever been breastfed? | Yes $\qquad$ <br> No. $\qquad$ <br> Don't know $\qquad$ |  | J010 |
| J005 | INTERVIEWER: Is the child the biological child of the informant? | Yes. $\qquad$ <br> No $\qquad$ | $\text { ................... } 12$ | J007 |
| J006 | How long after the birth did you first put the child (NAME) to the breast? <br> If the respondent reports that she put the infant to the breast immediately after birth, circle " 0 ". <br> If less than 1 hour, circle 01 and note " 00 " hours. <br> If less than 24 hours, circle 1 and note the number of hours completed, from 01 to 23. <br> In all other cases, circle 2 and note the number of completed days. | Immediately <br> Hours $\qquad$ 1 <br> Day 2 $\qquad$ |  |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE |  |  | SKIP TO |
| :---: | :---: | :---: | :---: | :---: | :---: |
| J007 | How many times was the child (NAME) breastfed during the daylight hours yesterday? <br> If not breastfed write ' $\mathbf{0 0}$ ' <br> (from sunrise to sunset) | No. Of times..................................................................................................................... |  |  |  |
| J008 | How many times was the child (NAME) breastfed last evening and night (to this morning when you woke up)? <br> (From sunset to sunrise) |  |  |  |  |
| J009 | At what age in months did the child (NAME) stop breastfeeding? <br> (Write completed month in the box) | Month................................................... 99 <br> Breastfeeding currently........... |  |  |  |
| J010 | Did the child (NAME) drink anything from a bottle with a nipple yesterday day or night? | Yes ............................................................................................... 2No ............. 1Don't know ............................................ 98 |  |  |  |
| J011 | During the last 12 months, did the child (NAME) participate in the infant and young child feeding (IYCF) linked with child cash grant program? |  |  |  |  |
| J012 | Now I would like to ask you about liquids other than breast milk that the child (NAME) had yesterday during the day or at night. I am interested in whether your child had the item I mention even if it was combined with other foods. <br> (Read each option one by one. Specify frequency for milk, infant formula, and yogurt) | 1. Other milk than bre (eg., thin, powder, a <br> 1.1 If yes, number of tit <br> 2. Plain water $\qquad$ <br> 3. Sugar or glucose wa <br> 4. Gripe water $\qquad$ <br> 5. Sugar-salt-water sol <br> 6. Fruit juice. $\qquad$ <br> 7. Infant formula (eg., <br> 7.1. If yes, number of <br> 8. Tea $\qquad$ <br> 9. Honey. $\qquad$ <br> 10. Bhat ko mar (rice <br> 11. Yogurt. $\qquad$ <br> 11.1. If yes, number of 96. Other (Specify) $\qquad$ <br> 98. Don't know. $\qquad$ <br> 77. Refuse to answer.. | milk al milk) s. $\square$ $\qquad$ $\qquad$ <br> on $\qquad$ $\qquad$ ctogen es $\square$ $\qquad$ $\qquad$ er/star ........... mes $\square$ $\qquad$ $\qquad$ $\qquad$ | es No <br> 1 2 <br> 1 2 <br>   <br>  2 <br> 1 2 <br> 1 2 <br> 1 2 <br> 1 2 <br> 1 2 <br> 1 2 <br>   |  |
| J013 | Now I would like to ask you about foods that the child (NAME) had yesterday during the day or at night. I am interested in whether your child had the item I mention even if it was combined with other foods. <br> (Read each food group option and examples one by one) |  |  |  |  |
|  |  |  | Yes | No |  |
| 1. | Foods made with grains (bread, biscuits, noodles, rice, jaulo or beaten rice, maize, wheat, millet or porridge made from these.) |  | 1 | 2 |  |
| 2 | White tubers and roots or other starchy food: potatoes, white yams, white sweet potato (not orange inside), or other foods made from roots. |  | 1 | 2 |  |
|  | Vitamin a rich vegetables and tubers pumpkin, carrots, squash, sweet potatoes that are orange inside (show example photograph) |  | 1 | 2 |  |
| 3. | Legumes and nuts (Beans, peas, lentils, nuts, seeds or food made from these) |  | 1 | 2 |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE |  |  | SKIP TO |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 4. | Dairy products (milk, yogurt, curd, cheese or other milk products, ghee) |  | 1 | 2 |  |
| 4.1 | If yes, number of times? |  |  |  |  |
| 5. | Liver, kidney, heart, or other organ meats or blood based foods? |  | 1 | 2 |  |
| 6. | Other flesh foods (chicken, mutton, buff, poultry, fresh or dried fish or shellfish?) |  | 1 | 2 |  |
| 7. | Eggs |  | 1 | 2 |  |
| 8. | Vitamin A rich fruits (Ripe mango, papaya, apricots,etc) |  | 1 | 2 |  |
| 9. | Other fruits (wild fruits, dried amala, banana, apple, seasonal fruits) |  | 1 | 2 |  |
| 10. | Any dark green, leafy vegetables like spinach, amaranth leaves, mustard leaves? |  | 1 | 2 |  |
| 11. | Any other vegetables? |  | 1 | 2 |  |
| 12. | Infant food such as cerelac, lito from superflour available in market, unilito, nutrimix, champion, and other fortified complementary food etc. |  | 1 | 2 |  |
| 13. | Cooking oil |  | 1 | 2 |  |
| 14. | Vegetable ghee |  | 1 | 2 |  |
| 15. | Animal ghee, butter or other fats |  | 1 | 2 |  |
| 16. | Any sugary foods such as chocolates, sweets, candies, pastries, cakes or cookies? |  | 1 | 2 |  |
| 17. | Any drinks made at home with added sugar (where sugar is mixed into the drink)? (eg. Rasna, Tang, Sarbat, etc.) |  | 1 | 2 |  |
| 18. | Any purchased drinks with added sugar (juice drinks with added sugar, fizzy drinks, soda) (Excludes diet soda)? |  | 1 | 2 |  |
| 19. | Tea |  | 1 | 2 |  |
| 20. | Tibetan tea (e.g., made with tea, ghee, and salt) |  | 1 | 2 |  |
| 21. | Coffee |  | 1 | 2 |  |
| 22. | Snails, larvae of wasps/aringal, edible insects? |  | 1 | 2 |  |
|  | If child did not eat any solid, semi-solid, or soft foods in j013 then ask j014, otherwise go to j015. |  |  |  |  |
| J014 | Did the child (NAME) eat any solid, semi-solid, or soft foods yesterday during the day or at night? <br> If 'yes' probe: what kind of solid, semi-solid, or soft foods did the child (name) eat? Go back to j013 and change response to yes for that row. |  |  |  |  |
| J015 | How many times did the child (NAME) eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night? | No. of times $\qquad$ $\square$ $\square$ <br> Don't know $\qquad$ 98 |  |  |  |
| Now I am going to ask you about certain foods that you have given to the child (NAME) that were prepared at home |  |  |  |  |  |
| J016 | Did the child (NAME) consume foods prepared in the house with purchased Maida or Aata wheat flour such as roti or chapatti, or other foods. yesterday, during the day or night? | Yes.................................................................................................................................................................... |  |  |  |
| J017 | During the last 7 days, how many days did the child (NAME) consume foods prepared in the house with purchased Maida and Aata flour such as roti or chapatti, or other foods? | No. of days $\qquad$ $\square$ $\square$ <br> Did not consume. $\qquad$ <br> Don't know $\qquad$ 98 |  |  |  |
| J018 | Did the child (NAME) consume foods prepared in the house with purchased vegetable ghee yesterday, during the day or night? | Yes $\qquad$ <br> No $\qquad$ <br> Don't know $\qquad$ |  |  |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| J019 | During the last 7 days, how many days did the child (NAME) consume foods prepared in the house with purchased vegetable ghee? | No. of days. $\qquad$ $\square$ $\square$ <br> Did not consume $\qquad$ <br> Don't know $\qquad$ 98 |  |
| J020 | Over the last 7 days, how many times did the child (NAME) eat clay, earth, or termite mounds? | No. of times .................................................................... Don't know ........... |  |
| J021 | Over the last 7 days, how many times did the child (NAME) eat uncooked rice, starch or ice? | No. of times ...................................................................... Don't know ........ |  |


| K. CHILD HEALTH |  |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| K001 | Did the child (NAME) receive a dose of vitamin A capsule in March 2016, which the government distributes twice annually? <br> (Show vitamin a capsule) |  |  |
| K002 | Was the child (NAME) given a deworming drug in March 2016, during government's vitamin A capsule distribution program? <br> (Show deworming example) |  |  |
| K003 | Did the child (NAME) go for child growth monitoring last month (last 30 days)? | Yes ....................................................... 1 No ........................................................................................................ Don't know ........ |  |
| K004 | Review the child card and document the dates of the two most recent child growth monitoring visits. | Child growth monitoring <br> Most recent date: $\square$ , $\square$ $\square$ $\square$ $\square$ $\square$ <br> Second most recent: $\square$ $\square$ $\square$ <br> Never gone $\qquad$ .92 <br> Dates not filled..................................... 93 <br> No card $\qquad$ 94 |  |
| K005 | During the mosquito season, does the child (NAME) sleep under a mosquito net? |  |  |
| K006 | Has the child (NAME) been ill with a fever at any time in the last 2 weeks? | Yes ....................................................... 1 No ....................................................................................................... Don't know ......... |  |
| K007 | Has the child (NAME) had an illness with a cough at any time in the last 2 weeks? |  |  |
| K008 | Has the child (NAME) had diarrhea in the last 2 weeks? | Yes ........................................................ 1 No ............................................................................................ 98 Don't know ........... | K010 |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| K009 | What treatment was given to the child (name) for the diarrhea? <br> Do not read response options, mark all treatment given. | Ors $\qquad$ <br> Zinc supplements $\qquad$ b <br> Antiobiotics $\qquad$ c <br> Anti-diarrheals $\qquad$ d <br> Home remedies $\qquad$ e <br> Other (specify). $\qquad$ <br> Did not give treatment $\qquad$ y |  |
| K010 | During the last 12 months, did the child (NAME) receive treatment in the Indicated Management of Acute Malnutrition (IMAM) program for acute malnutrition (marasmus or kwarshiorker)? |  |  |
| K011 | In the last seven days, was the child (NAME) given iron syrup or tablets like this? <br> (Request to observe the bottle and circle the correct answer) | Yes, observed ....................................... 1 Yes, not observed ......................................................................................................................................................... No | K013 |
| K012 | In the last seven days, on how many days was the child (NAME) given iron syrup or tablets? | Number of days .................... |  |
| K013 | In the last seven days, was the child (NAME) given food mixed with Baal Vita? <br> Show baal vita sachet. <br> (request to observe the sachets and circle the correct answer) |  | K015 |
| K014 | In the last seven days, on how many days was the child (NAME) given Baal vita sachets like this? | Number of days |  |
| K015 | Within the last 7 days, did the child (NAME) take a Zinc tablet? <br> Show example. <br> If yes, ask to see the package. | $\left.\begin{array}{l}\text { Yes, observed ............................................ } 1 \\ \text { Yes, not observed ............................................................................................................................................ } \\ \text { No...... } \\ \text { Don't know ...... }\end{array}\right\}$ | $\text { 3\}K017 }$ |
| K016 | On how many days over the last 7 days, did the child (NAME) take a zinc tablet | Number of days |  |
| K017 | In the last 24 hours, did the child (NAME) take a zinc tablet? <br> Instruction: tell the mother that 24 hours is since yesterday at this time today. | $\left.\begin{array}{l}\text { Yes, observed ........................................ } 1 \\ \text { Yes, not observed ............................................................................................................................................................ } \\ \text { No } \\ \text { Don't know ......... }\end{array}\right\}$ | \} K019 |
| K018 | How many hours ago did the child (NAME) consume the zinc tablet? <br> If consumed less than one hour ago, write 0 | Number of hours................... $\square$ |  |


| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| :---: | :---: | :---: | :---: |
| K019 | Did this child receive fortified blended flour as part of the "Mother Child Health Nutrition" (MCHN) program in the last month (last 30 days)? |  |  |
| K020 | Do you think the child (NAME) is at a healthy weight, is underweight, or is the child (NAME) overweight? | Healthy weight....................................... 1 Underweight ........................................................................................ |  |

Interview completed time :



Hours Minutes



| Stool Sample |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Verification of process for taking sample |  |  |  |  |  |
| L018 | Sample taken | Yes ..................... 1 | No...................... 2 |  |  |
| L019 | Sufficient Volume | Yes ..................... 1 | No...................... 2 |  |  |
| L020 | Date sample retrieved (Day/Month/Year) | $\square \square, \square$ | 2 l | 7 |  |
| MRDR VENOUS Blood Sample |  |  |  |  |  |
| Verification of process for taking sample |  |  |  |  |  |
| Instructions: Vitamin A2 will be administered to a preselected subsample of children. You must return to the child's home 4 hours after Vitamin A2 administration to collect a venous blood sample. |  |  |  |  |  |
| L021 | Child selected for MRDR subsample | Yes ..................... 1 | No...................... 2 |  |  |
| L022 | Consent obtained | Yes ..................... 1 | No...................... 2 |  |  |
| L023 | Counseled child's mother/caregiver | Yes ..................... 1 | No...................... 2 |  |  |
| L024 | Sample taken | Yes ..................... 1 | No...................... 2 |  |  |
| L025 | Sufficient volume | Yes, completely ................................................ 1Yes, Partially......................................................................................................................................................................... 4 |  |  |  |
| Realization of test for MRDR |  |  |  |  |  |
| L026 | Time dose of Vit A2 ingested |  |  |  |  |
| L027 | Time MRDR blood collection began (Hour: minute) | + | nute |  |  |
| L028 | Date sample taken (Day/Month/Year) | $\square \square \square$ | 2 O | 7 |  |

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Assent Consent - for Children 6 to 9 Years

Namaste! My name is $\qquad$ I am here from (name of survey organization) to collect data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions. We will also ask you to go to the bathroom and collect urine in a small cup (equal to a few tablespoons). The cup is brand new and is not re-used. We will later test this urine to understand if people in Nepal eat enough of the mineral called iodine. We would very much appreciate your participation in this survey. This survey will take about 20 minutes for most participants to complete.

There is low risk if you participate in this survey. There is a small chance that some of the questions or being asked to give urine might cause emotional discomfort. If there are questions that you are not comfortable with, you are free to refuse to answer. Before the team leaves your house, they will give you the contact details of the survey manager. You can use these contacts to talk about any problems you might have with taking part in this survey.

For participating in this survey, your household will receive a shawl, towel, toothpaste, toothbrush, soap and nail cutter.If you participate in the survey, the information you give us with the questions and urine will not directly benefit you. We will add the information you give us to that of other participants in the survey and create a report. This report will tell us about the health and nutrition of people in Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to you and all of the results will be shown in the report for the entire group.

Remember that you do not have to be in this survey. You can choose if you want to volunteer. You can also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Assent Consent - for Children 6 to 9 Years

Please complete this form after you have read the information sheet to the targeted participant

Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)
"Thank you for your interest in taking part in the NNMSS. Before you agree to take part, we must explain the survey project to you.

If you have any questions arising from the explanation already given to you, please ask questions to help you to decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

## Participant's Statement

I $\qquad$ (mention name)

- have read/listened to the notes written above and the explanation, and understand what thesurvey involves.
- understand that if I decide at any time that I no longer wish to take part in this survey, I can stop at any time and withdraw immediately.
- agree to have my personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree to take part in this survey.
- understand that the information will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify me from any publications.
- am assured that the confidentiality of my personal information will be upheld by not including the name or any other identifying information.

Participant's Name: $\qquad$ Participant's Age: $\qquad$ Years

Parent/Legal guardian's Name: $\qquad$
Signed:
Date:
Witness Name: $\qquad$ (If participant' Parent/Legal guardian is illiterate)
Signed:
Date:

Field Researcher $\qquad$ (this will be done immediately at the field)

Name:
Signed:
One of the Co-Investigator of the Research Study $\qquad$ (this will be done later on)
Name:
Post:
Signed:
Date

## NEPAL NATIONAL MICRONUTRIENT STATUS SURVEY - 2072/73 QUESTIONNAIRE FOR CHILDREN 6-9 YEARS



| U. GENERAL CHARACTERISTICS OF RESPONDENT |  |  |  |
| :---: | :---: | :---: | :---: |
| NO. | QUESTIONS AND FILTERS | CODING CATEGORIES | SKIP TO |
| U022 | In what month and year were you born? | Month ...................................... $\square$ ■ Don't know ........................................... 98 Year......................... $\square$ _ Don't know ....................................... 9998 |  |
| U023 | How old were you at your last birthday? <br> (Age in completed years Verify age with q. U022) | Age in completed years. $\qquad$ $\square$ <br> Don't know $\qquad$ 98 |  |
| U024 | Have you ever attended school? | Yes................................................................................................................ | $\rightarrow$ U028 |
| U025 | During the last 12 months, did you participate in the school health and nutrition program? <br> (If children do not know, have them consult with parents/adults) |  |  |
| U026 | What is the highest grade you completed? <br> (If completed less than one grade, record ‘00’) | Grade ...................................... $\square$ |  |
| U027 | Grade 5 for lower | Grade 6 for higher |  |
| U028 | Now I would like you to read this sentence to me. <br> Show card to respondent. <br> If respondent cannot read whole sentence, probe: <br> Can you read any part of this sentence to me? | Cannot read at all $\qquad$ 1 <br> Able to read only parts of sentence .............. 2 <br> Able to read wholesentence. $\qquad$ 3 <br> No card with required language: <br> Specify language $\qquad$ 4 <br> Blind/visually impaired . $\qquad$ 5 |  |
| U029 | What is your caste/ethnicity? |  |  |


|  | V. DIETARY DIVERSITY |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| V001 | How long has it been since you last ate or drank anything other than water? | 1. Minutes .. |  |  |  |  |
| Now I would like to ask about foods and liquids that you may have had yesterday during the day or at night. I am interested in whether you had the item even if it was combined with other foods. Since yesterday did you eat or drink: |  |  |  |  |  |  |
| V002 | Cereals: rice, roti, bread, puffed rice, maize/corn, pressed rice, noodles, millet, porridge, wheat, buckwheat, or other foods made from grains? |  | YES <br> 1 | NO 2 | DON'T KNOW $98$ |  |
| V003 | White tubers and roots or other starchy food: potatoes, white yams, white sweet potato (not orange inside), or other foods made from roots. |  | 1 | 2 | 98 |  |
| V004 | Beans, peas, or lentils or any foods made from these? |  | 1 | 2 | 98 |  |
| V005 | Nuts and seeds or any foods made from these? |  | 1 | 2 | 98 |  |
| V006 | Milk and milk products: milk, cheese, yogurt, or other food made from milk? |  | 1 | 2 | 98 |  |
| V007 | Eggs: chicken, duck, quail, etc |  | 1 | 2 | 98 |  |
| V008 | Organ meat: liver, kidney, heart, or other organ meats |  | 1 | 2 | 98 |  |
| V009 | Other meat: buff, lamb, goat, chicken or duck? |  | 1 | 2 | 98 |  |
| V010 | Fish: big/small fresh or dried or shellfish such as prawn, crab, etc |  | 1 | 2 | 98 |  |
| V011 | Dark green leavy vegetables spinach, amaranth leaves, mustard leaves, pumpkin leaves, colocasia leaves, other? |  | 1 | 2 | 98 |  |
| V012 | Vitamin a rich vegetables and tubers: pumpkin, carrots, squash, sweet potatoes that are orange inside (show example photograph)? |  | 1 | 2 | 98 |  |
| V013 | Other vegetables: cauliflower, cabbage, eggplant, green papaya, radish, onion, |  | 1 | 2 | 98 |  |
| V014 | Vitamin rich fruits: ripe mangoes, ripe papayas, jack fruit |  | 1 | 2 | 98 |  |
| V015 | Other fruits: tomatoes, bananas, apples, guavas, oranges, other citrus fruits, pineapple, watermelon, grapes, strawberries, plum, etc |  | 1 | 2 | 98 |  |
| V016 | Sweets: sugar, honey, rock candy, chocolates, biscuits, |  | 1 | 2 | 98 |  |
| V017 | Any cold drinks made at home with added sugar (where sugar is mixed into the drink)? E.g., Rasna, Tang, Sarbat, etc |  | 1 | 2 | 98 |  |
| V018 | Any purchased cold sweet drinks with sugar (juice drinks with added sugar, fizzy drinks, soda)? (excludes diet soda) |  | 1 | 2 | 98 |  |
| V019 | Tea |  | 1 | 2 | 98 |  |
| V020 | Tibetan tea (e.g., made with tea, ghee, and salt) |  | 1 | 2 | 98 |  |
| V021 | Coffee |  | 1 | 2 | 98 |  |
| V022 | Vegetable ghee |  | 1 | 2 | 98 |  |
| V023 | Cooking oil |  | 1 | 2 | 98 |  |
| V024 | Other fats: butter, animal ghee, etc |  | 1 | 2 | 98 |  |
| V025 | Snails, larvae of wasps/aringal, edible insects? |  | 1 | 2 | 98 |  |
| V026 | Other foods not mentioned, specify: |  | 1 | 2 | 98 |  |


| V. HEALTH HISTORY |  |  |  |
| :---: | :---: | :---: | :---: |
| V028 | Have you been ill with a fever at any time in the past 2 weeks? |  |  |
| V029 | Have you had an illness with a cough at any time in the last 2 weeks? | Yes ............................................................................................. 2 No............ Don't know ............................................ 98 |  |
| V030 | Have you had diarrhea in the last 2 weeks? | Yes ..................................................................................................... 2 No............................................................. Don't know ........ |  |
| V031 | How many times in the past week (7 days) have you eaten clay, earth, or termite mound? <br> If never eaten enter ' 00 ' | Number of times consumed $\square \square$ |  |
| V032 | How many times in the past week (7 days) have you eaten uncooked rice, starch, ice? <br> If never eaten enter ' 00 ' | Number of times consumed $\square \square$ |  |
| V033 | Did you take any drug for intestinal worms in the last six months? <br> Show examples/Ask parents if child is unsure | Yes, took at school........................... 1 Yes, from health facility................... 2 Yes, from somewhere else ............ 3 No...................................................... 4 Don't know ..................................... 98 |  |

Time interview ended:


Hour


Minute
W. BIOLOGICAL MEASUREMENT
SAMPLES TAKEN FOR ELIGIBLE CHILDREN 6-9 YEARS
Confirm the line number for selected children (See Household roster):
Sex: 1 Male 2 Female
W001 Name of Phlebotomist:


## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Assent Consent - for Adolescent Boys 10 to 19 Years

Namaste! My name is.
I am here from (name of survey organization) to collect the data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions. We will also ask to measure your height and weight and to collect two small tubes of blood (equal to about 1teaspoon) from a vein in your arm. The test uses disposable new instruments that are clean and safe. We will use this blood to tell you during this visit if you have anemia or malaria. We would very much appreciate your participation in this survey. This survey will take about one hour for most participants to complete.

There is low risk if you participate in this survey. There is a small chance that some of the questions we ask might cause emotional discomfort or distress. If there are questions that you are not comfortable with, you are free to refuse to answer. There is a small chance that you may have some physical discomfort from the needle used to collect blood. Only trained staff persons specialized in blood collection will collect the blood from you. There will only be at most two attempts to collect the blood. Health problems that result from taking part in a survey like this are rare. Before the team leaves your house, they will give you the contact details for your local health clinic. They will also give you the contact details of the survey manager. You can use these contacts to talk about any problems you might have with taking part in this survey.

For participating in this survey, your household will receive a shawl, towel, toothpaste, toothbrush, soap and nail cutter. If you will participate in the survey, the benefit to you for taking part in this survey is that you will get the results for height, weight, anemia and malaria. The information you give us with the questions and other tests from the blood will not directly benefit you. We will add the information you give us to that of other participants in the survey and create a report. This report will tell us about the health and nutrition of people in Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to you and all of the results will be shown in the report for the entire group.

Remember that you do not have to be in this survey. You can choose if you want to volunteer. Youcan also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

# Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Assent Consent - for Adolescent Boys 10 to 19 Years 

## Please complete this form after you have read the information sheet to the targeted participant

## Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)

Thank you for your interest in taking part of the NNMSS. Before you agree to take part, we must explain the survey project to you.
If you have any questions arising from the explanation already given to you, please ask questions to help you to decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

## Participant's Statement

I $\qquad$ (mention name)

- have read/listened to the notes written above and the explanation, and understand what the survey involves.
- understand that if I decide at any time that I no longer wish to take part in this survey, I can stop at any time and withdraw immediately.
- agree to have my personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree to take part in this survey.
- understand that the information will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify me from any publications.
- am assured that the confidentiality of my personal information will be upheld by not including the name or any other identifying information.


NEPAL NATIONAL MICRONUTRIENT STATUS SURVEY - 2072/73 QUESTIONNAIRE FOR ADOLESCENT BOYS 10-19 YEARS


| Q. GENERAL CHARACTERISTICS OF RESPONDENT |  |  |  |
| :---: | :---: | :---: | :---: |
| NO. | QUESTIONS AND FILTERS | CODING CATEGORIES | SKIP TO |
| Q021 | In what month and year were you born? |  |  |
| Q022 | How old were you at your last birthday? <br> (Age in completed years <br> Verify age with q021) | Age in completed years. $\qquad$ $\square$ <br> Don't know $\qquad$ 98 |  |
| Q023 | Have you ever attended school? | Yes....................................................................................................................... No | Q027 |
| Q024 | During the last 12 months, did you participate in the school health and nutrition program? <br> If children do not know, have them consult with parents/adults. | Yes....................................................................................................................................... 98 |  |
| Q025 | What is the highest grade you completed? <br> If completed less than one grade, record ' 00 ' <br> $10=$ slc pass <br> 11 = certificate level (ia/icom) <br> $12=$ bachelor level (ba/bcom) <br> 13 = master level and above | Grade............................... $\square$ |  |
| Q026 | Grade 5 for lower | Grade 6 for higher |  |
| Q027 | Now I would like you to read this sentence to me. Show card to respondent. <br> If respondent cannot read whole sentence, probe: <br> Can you read any part of this sentence to me? | Cannot read at all .................................... 1 Able to read only parts of sentence.......... 2 Able to read whole sentence ............... 3 No card with required language: Specify language_........... 4 Blind/visually impaired....................... 5 |  |
| Q028 | Are you currently married or living together with a woman as if married? |  |  |


| No. | Questions and Filters | Coding Categories | Skip to |
| :---: | :---: | :---: | :---: |
| Q029 | Are you currently married or living together with a woman as if married? | Yes, civil married................................... 1 Yes, living with a girl .......................... 2 No, not in union ...................................... 3 | R001 |
| Q030 | Have you ever been married or lived together with a woman as if married? | Yes, formerly married............................ 1 Yes, lived with a girl $\quad . . . . . . . . . . . . . . . . . . . . . . . ~$ 2 | R001 |
| Q031 | What is your marital status now: are you widowed, divorced, or separated? | Widowed............................................... 1 Divorce .................................................... 2 Separated .................................................. 3 |  |


|  | R. DIETARY DIVERSITY |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| R001 | How long has it been since you last ate or drank <br> anything other than water? | MINUTES..................... | $\square$ | $\square$ |

Now I would like to ask about foods and liquids that you may have had yesterday during the day or at night. I am interested in whether you had the item even if it was combined with other foods. Since yesterday did you eat or drink:

| R002 | Cereals: Rice, roti, bread, puffed rice, maize/corn, pressed rice, noodles, millet, porridge, wheat, buckwheat, or other foods made from grains? | $\begin{gathered} \text { YES } \\ 1 \end{gathered}$ | $\begin{gathered} \text { NO } \\ 2 \end{gathered}$ | $\begin{aligned} & \text { DON'T } \\ & \text { KNOW } \\ & 98 \end{aligned}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| R003 | White tubers and roots or other starchy food: potatoes, white yams, white sweet potato (not orange inside), or other foods made from roots. | 1 | 2 | 98 |  |
| R004 | Beans, peas, or lentils or any foods made from these? | 1 | 2 | 98 |  |
| R005 | Nuts and seeds or any foods made from these? | 1 | 2 | 98 |  |
| R006 | Milk and milk products: Milk, cheese, yogurt, or other food made from milk? | 1 | 2 | 98 |  |
| R007 | Eggs: Chicken, duck, quail, etc. | 1 | 2 | 98 |  |
| R008 | Organ meat: Liver, kidney, heart, or other organ meats | 1 | 2 | 98 |  |
| R009 | Other meat: Buff, lamb, goat, chicken or duck? | 1 | 2 | 98 |  |
| R010 | Fish: Big/small fresh or dried or shellfish such as prawn, crab, etc | 1 | 2 | 98 |  |
| R011 | Dark green leavy vegetables spinach, amaranth leaves, mustard leaves, pumpkin leaves, Colocasia leaves, other? | 1 | 2 | 98 |  |
| R012 | Vitamin a rich vegetables and tubers: Pumpkin, carrots, squash, sweet potatoes that are orange inside (show example photograph)? | 1 | 2 | 98 |  |
| R013 | Other vegetables: Cauliflower, cabbage, eggplant, green papaya, radish, onion, | 1 | 2 | 98 |  |
| R014 | Vitamin rich fruits: ripe mangoes, ripe papayas, jack fruit | 1 | 2 | 98 |  |
| R015 | Other fruits: tomatoes, bananas, apples, guavas, oranges, other citrus fruits, pineapple, watermelon, grapes, strawberries, plum, etc | 1 | 2 | 98 |  |
| R016 | SWEETS: Sugar, honey, rock candy, chocolates, biscuits, | 1 | 2 | 98 |  |
| R017 | Any cold drinks made at home with added sugar (where sugar is mixed into the drink)? E.g., Rasna, Tang, sarbat, etc | 1 | 2 | 98 |  |
| R018 | Any purchased cold sweet drinks with sugar (juice drinks with added sugar, fizzy drinks, soda)? (Excludes diet soda) | 1 | 2 | 98 |  |
| R019 | Tea | 1 | 2 | 98 |  |
| R020 | Tibetan tea (e.g., made with tea, ghee, and salt) | 1 | 2 | 98 |  |
| R021 | Coffee | 1 | 2 | 98 |  |
| R022 | Vegetable ghee | 1 | 2 | 98 |  |
| R023 | Cooking oil | 1 | 2 | 98 |  |


| R024 | Other fats: Butter, animal ghee, etc | 1 | 2 | 98 |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| R025 | Snails, larvae of wasps/aringal, edible insects? | 1 | 2 | 98 |  |
| R026 | Other foods not mentioned, specify: | 96 |  |  |  |


| R. VITAMIN AND MINERAL SUPPLEMENT INTAKE |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | QUESTIONS AND FILTERS | CODING CATEGORIES |  |  |  |
|  | Since yesterday did you consume a: $\qquad$ <br> (circle the correct answer) | YES, OBSERVED | YES, NOT OBSERVED | NO | DON'T <br> KNOW |
| R027 | Multivitamin or multiple micronutrient supplement? <br> If yes, ask to see the package | 1 | 2 | 3 | 98 |
| R028 | Iron, such as iron tablets or iron syrup? <br> If yes, ask her to see the package | 1 | 2 | 3 | 98 |
| R029 | Folic acid? <br> If yes, ask her to show you the package | 1 | 2 | 3 | 98 |
| R030 | Vitamin A ? <br> If yes, ask to see the package | 1 | 2 | 3 | 98 |
| R031 | Within the last 7 days, did you take a Zinc tablet? <br> Show example. <br> If yes, ask to see the package <br> If no or don't know, skip to R033 <br> On how many days over the last 7 days, did you take a zinc tablet? <br> Show example. | 1 | 2 | 3 | 98 |
| R032 |  | No. of Days: $\square$ |  |  |  |
| R033 | In the last 24 hours, did you take a zinc tablet? <br> Instruction: tell the boy that 24 hours is since yesterday at this time today. | 1 | 2 | 3 | 98 |
| R034 | How many hours ago did you consume the zinc tablet? <br> If consumed less than one hour ago, write ' 00 ' |  | r ago: $\square$ |  |  |
| R035 | Did you take any drug for intestinal worms in the last six months? <br> Show examples. | Yes, took at school................................. 1Yes, somewhere else ................................................................................................................................................................. |  |  |  |
| R036 | Did you ever take a combined iron and folic acid tablet in the last six months? <br> Multiple choice apply. | Yes, from sch <br> Yes, from fch <br> Yes, from mo <br> Yes, other so <br> No. $\qquad$ <br> Don't know | ool $\qquad$ .. health facilit rce. $\qquad$ $\qquad$ $\qquad$ |  |  |
| S. HEALTH HISTORY |  |  |  |  |  |
| S001 | Have you ever smoked cigarettes? Yes ..... <br> no ......  |  |  |  | S003 |



Time interview ended:


Hour


| T. ANTHROPOMETRY |  |  |  |
| :---: | :---: | :---: | :---: |
| Measure | T001 <br> Result for measurement | T002 <br> Measure | T003 Person who did measuring |
| A. Height (Centimeters) |  |   <br> CM | Code $\square$ <br> Name $\qquad$ |
| B. Weight (Kilograms) |  | KG | Code $\square$ <br> Name: $\qquad$ |



# Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Assent Consent - for Adolescent Girls 10 to 19 Years 

Namaste! My name is.......................................... I am here from (name of survey organization) to collect the data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions. We will also ask to measure your height and weight and to collect two small tubes of blood (equal to about 1 teaspoon) from a vein in your arm. The test uses disposable new instruments that are clean and safe. We will use this blood to tell you during this visit if you have anemia or malaria. We would very much appreciate your participation in this survey. This survey will take about one hour for most participants to complete.

There is low risk if you participate in this survey. There is a small chance that some of the questions we ask might cause emotional discomfort or distress. If there are questions that you are not comfortable with, you are free to refuse to answer. There is a small chance that you may have some physical discomfort from the needle used to collect blood. Only trained staff persons specialized in blood collection will collect the blood from you. There will only be at most two attempts to collect the blood. Health problems that result from taking part in a survey like this are rare. Before the team leaves your house, they will give you the contact details for your local health clinic. They will also give you the contact details of the survey manager. You can use these contacts to talk about any problems you might have with taking part in this survey.

For participating in this survey, your household will receive a shawl, towel, toothpaste, toothbrush, soap and nail cutter. If youwill participate in the survey, the benefit to youfor taking part in this survey is that you will get the results for height, weight, anemia and malaria. The information you give us with the questions and other tests from the blood will not directly benefit you. We will add the information you give us to that of other participants in the survey and create a report. This report will tell us about the health and nutrition of people in Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to you and all of the results will be shown in the report for the entire group.

Remember that you do not have to be in this survey. You can choose if you want to volunteer. Youcan also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 <br> Informed Written Assent Consent - for Adolescent Girls 10 to 19 Years

Please complete this form after you have read the information sheet to the targeted participant

Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)
"Thank you for your interest in taking part of the NNMSS. Before you agree to take part, we must explain the survey project to you.
If you have any questions arising from the explanation already given to you, please ask questions to help you to decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

## Participant's Statement

I $\qquad$ (mention name)

- have read/listened to the notes written above and the explanation, and understand what thesurvey involves.
- understand that if I decide at any time that I no longer wish to take part in this survey, I can stop at any time and withdraw immediately.
- agree to have my personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree to take part in this survey.
- understand that the information will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify me from any publications.
- am assured that the confidentiality of my personal information will be upheld by not including the name or any other identifying information.

| Participant's Name: ___ Participant's Age: ___ Years |  |
| :--- | :--- |
| Signed: | Date: |

Parent/Legal guardian's Name: $\qquad$ (If participant's age is under 18 years)
Signed:
Date:

Witness Name: $\qquad$ (If participant' Parent/Legal guardian is illiterate)
Signed:
Date:

Field Researcher. $\qquad$ (this will be done immediately at the field)
Name: Post:
Signed:
Date:
One of the Co-Investigator of the Research Study. $\qquad$ (this will be done later on)
Name:
Post:
Signed:
Date

NEPAL NATIONAL MICRONUTRIENT STATUS SURVEY - 2072/73 QUESTIONNAIRE FOR ADOLESCENT GIRLS 10-19 YEARS


| M. GENERAL CHARACTERISTICS OF RESPONDENT |  |  |
| :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CODING CATEGORIES SKIP TO |
| M021 | In what month and year were you born? |  |
| M022 | How old were you at your last birthday? <br> Verify with Q. M021 | Age in completed years $\qquad$ $\square$ <br> Don't know $\qquad$ 98 |
| M023 | Have you ever attended school? | Yes .............................................................................................................. ${ }^{2}$ M027 No...... |
| M024 | During the last 12 months, did you participate in the school health and nutrition program? <br> If children do not know, have them consult with parents/ adults. |  |
| M025 | What is the highest grade you completed? <br> If completed less than one grade, record ' 00 ' 10 = SLC pass <br> 11 = Certificate Level (IA/ICom) <br> $12=$ Bachelor Level (BA/BCom) <br> $13=$ Master Level and above | Grade $\square$ |
| M026 | GRADE 5 FOR LOWER | Grade 6 for higher <br> M028 |
| M027 | Now I would like you to read this sentence to me. <br> Show card to respondent. <br> If respondent cannot read whole sentence, probe: <br> Can you read any part of this sentence to me? |  |
| M028 | What is your caste/ethnicity? |  |
| M029 | Are you currently married or living together with a man as if married? | $\left.\begin{array}{l}\text { Yes, civil married .................................................................................................................. } \\ \text { Yes, living with a man } \\ \text { No, not in union.......... }\end{array}\right\}$ N001 |
| M030 | Have you ever been married or lived together with a man as if married? | Yes, formerly maried .............................. 1 Yes, lived with a man............................................................................................... no...... |


| M031 | What is your marital status now: are you widowed, <br> divorced, or separated? | Widowed ................................................. 1 <br> Divorce......................................................................................................................... <br> Separated...... |
| :--- | :--- | :--- | :--- |


|  | N. DIETARY DIVERSITY |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| N001 | How long has it been since you last ate or drank <br> anything other than water? | 1. Minutes ....................... |  |  |  |

Now I would like to ask about foods and liquids that you may have had yesterday during the day or at night. I am interested in whether you had the item even if it was combined with other foods. Since yesterday did you eat or drink.


| N. VITAMIN AND MINERAL SUPPLEMENT INTAKE |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Since yesterday did you consume a: $\qquad$ <br> (Circle the correct answer) | YES, OBSERVED | YES, NOT OBSERVED | NO | DON'T KNOW |
| N027 | Multivitamin or multiple micronutrient supplement? <br> If yes, ask to see the package | 1 | 2 | 3 | 98 |
| N028 | Iron supplement, such as iron tablets or iron syrup? <br> If yes, ask her to see the package | 1 | 2 | 3 | 98 |
| N029 | Folic acid supplement? <br> If yes, ask her to show you the package | 1 | 2 | 3 | 98 |
| N030 | Vitamin a supplement? <br> if yes, ask to see the package | 1 | 2 | 3 | 98 |
| N031 | Within the last 7 days, did you take a zinc tablet? <br> Show example. <br> If yes, ask to see the package <br> If no or don't know, skip to n033 | 1 | 2 | 3 | 98 |
| N032 | On how many days over the last 7 days, did you take a zinc tablet? | No. of Days: $\square$ |  |  |  |
| N033 | In the last 24 hours, did you take a zinc tablet? <br> Instruction: tell the girl that 24 hours is since yesterday at this time today. <br> If no or don't know, skip to n035 | 1 | 2 | 3 | 98 |
| N034 | How many hours ago did you consume the zinc tablet? | Hour ago: $\square$ |  |  |  |
| N035 | Did you take any drug for intestinal worms in the last six months? <br> Show examples. | Yes, took at sch <br> Yes, somewher <br> No. $\qquad$ <br> Don't know $\qquad$ | ol. <br> else |  | $\begin{array}{r} \hline \ldots . . . .1 \\ \ldots . . . . .2 \\ \ldots . . . . \\ \ldots \\ \ldots . . \\ \hline \end{array}$ |
| N036 | Did you ever take a combined iron and folic acid tablet in the last six months? <br> Show examples. <br> Multiple choice apply. | Yes, from scho Yes, from fchv Yes, from moh Yes, other sour No. $\qquad$ Don't know | $\square$ <br> ealth facility $\qquad$ $\qquad$ $\qquad$ |  |  |


| O. HEALTH HISTORY/MICRONUTRIENTS IN PREGNANCY |  |  |  |
| :---: | :---: | :---: | :---: |
| Q.No. | Questions and Filters | Categories and Code | Go to |
| O001 | Are you pregnant now? | Yes ............................................................................................... 2 No ............ Don't know .............................................. 8 | O003 |
| O002 | If yes, how many months are you pregant? | Number of months ........................ $\square$ |  |
| O003 | Have you given birth in the last five years? | Yes .................................................................................................... 1 | O021 |
| O004 | Are you currently lactating/breastfeeding? | Yes .................................................................................................... 2 |  |
| O005 | During your last pregnancy, did you have trouble with your vision? |  | 0007 |
| O006 | During your last pregnancy, at what time of day did you have trouble with your vision? | Daytime only ........................................ 1 Night time only ............................................................. 3 Both day and night...................................... 98 Don't know ..................... |  |
| 0007 | During your last pregnancy, did you take any drug for intestinal worms? <br> Show examples | Yes ......................................................................................................................................................................................................... No Don't know |  |
| O008 | During your last pregnancy, did you take any iron/folic acid tablets? <br> Show tablets. |  | O010 |
| O009 | If yes, where did you get the iron/folic acid tablets? <br> Multiple answers apply. |  | O011 |
| O010 | If no, why did you not take any iron/folic acid tablets during your last pregnancy? <br> Multiple answers apply. | Did not know I needed to take them ..... A <br> Did not know where to get them........... B <br> Side effects. $\qquad$ C <br> Forgot. $\qquad$ D <br> Husband/family would not allow <br> Me to. $\qquad$ E <br> Too expensive $\qquad$ <br> OTHER (SPECIFY) $\qquad$ |  |
| O011 | How many iron/folic acid tablets did you take during your last pregnancy? | Number of tablets consumed ...................... (IF 180 OR MORE TABLETS CONSUMED, SKIP TO O013) |  |
| 0012 | Why did you not consume 180 iron/folic acid tablets during your last pregnancy? <br> Multiple answers apply. | Did not have all 180 tablets. $\qquad$ A <br> Did not know I should take a total <br> of 180 tablets. $\qquad$ B <br> I did not need them $\qquad$ C <br> Side effects. $\qquad$ D <br> Forgot. $\qquad$ E <br> Husband/family would not allow me to.. F <br> Too expensive. $\qquad$ <br> Other (specify) $\qquad$ |  |


| O013 | After delivery of your last pregnancy, did you taken any iron/folic acid tablets? <br> Show tablets. | Yes ......................................................................................................................................................................... <br> no <br> Don't know ......... | - O015 |
| :---: | :---: | :---: | :---: |
| O014 | If yes, where did you get the iron/folic acid tablets? <br> Multiple answers apply. |  | O016 |
| O015 | If no, why did you not take any iron/folic acid tablets after delivery of your last baby? <br> Multiple answers apply. | Did not know I needed to take them ..... A <br> Did not know where to get them........... B <br> Side effects. $\qquad$ C <br> Forgot. $\qquad$ D <br> Husband/family would not allow <br> Me to. $\qquad$ E <br> Too expensive $\qquad$ <br> Other (Specify) $\qquad$ |  |
| O016 | How many iron/folic acid tablets did you take after delivery your last pregnancy? | Number of tablets consumed. $\square$ (If 45 or more tablets consumed, skip to O018) |  |
| O017 | Why did you not consume 45 iron/folic acid tablets during your last pregnancy? <br> Multiple answers apply. |  |  |
| 0018 | Within 6 weeks ( 45 days) after delivery of your last pregnancy, did you receive a vitamin A dose? <br> Show vitamin A capsules. |  |  |
| O019 | During your last pregnancy (before the baby was born), did a health care worker or FCHV talk to you about how to feed your baby? | Yes, health worker.................................. 1 Yes, FCHV ................................................ 2 Yes, both health worker and FCHV...... 3 No...................................................................................... 98 Don’t know ............... |  |
| O020 | After your last baby was born, did a health care worker or FCHV talk to you about how to feed your baby? | Yes, health worker.................................. 1 Yes, FCHV ................................................ 2 Yes, both health worker and FCHV...... 3 No...................................................................................... 98 Don’t know ............... |  |
| O021 | Have you ever smoked cigarettes? | Yes ....................................................................................................... 1 no | O023 |
| 0022 | During the last 30 days, on average how many cigarettes did you smoke in a day? | Average number of cigarrettes... $\square \square$ Don't know........................................... 98 |  |
| 0023 | Have you been ill with a fever at any time in the past 2 weeks? | Yes .................................................................................................................................................................. No Don't know ......... |  |


| O024 | Have you had an illness with a cough at any time in the last 2 weeks? | Yes ................................................................................................ 2 No ............. Don't know ............................................ 98 |  |
| :---: | :---: | :---: | :---: |
| O025 | Have you had diarrhea in the last 2 weeks? | Yes ......................................................... 1 No .................................................................................................. Don't know ......... |  |
| O026 | How many times in the past week (7 days) have you eaten clay, earth, or termite mounds? <br> If never eaten enter ' 00 ' | Number of times consumed |  |
| O027 | How many times in the past week (7 days) have you eaten uncooked rice, starch, ice? <br> If never eaten enter ' 00 ' | Number of times consumed |  |

Time interview ended:


| P. ANTHROPOMETRY |  |  |  |
| :---: | :---: | :---: | :---: |
| Measure | P001 Result of Measurement | P002 <br> Measure | P003 Person who did measuring |
| A. Height (Centimeters) | Measured ................................ 1 Not present.................................................................... Refused Others__(Specify) | $\square$ <br> CM | Code $\square$ <br> Name $\qquad$ |
| B. Weight (Kilograms) |  | $\square$ <br> KG | Code $\square$ <br> Name: $\qquad$ |



## Nepal National Micro-nutrient Status Survey (NNMSS), 2016 Informed Written Consent - for Non-Pregnant and Pregnant Women 15 to 49 Years

Namaste! My name is ................................................ I am here from (name of survey organization) to collect the data for a national survey for the Ministry of Health and Population (MoHP) about nutrition and health of people in Nepal.

During this survey, I will ask you some questions. We will also ask to measure your height and weight and to collect three small tubes of blood (equal to about 1 teaspoon each) from a vein in your arm. If you are pregnant, we will only collect two small tubes of blood and not three. The test uses disposable new instruments that are clean and safe. We will use this blood to tell you during this visit if you have anemia, malaria or Visceral leishmaniasis (Kala-azar). The rest of the blood will be analysed later to learn about the causes of anemia and vitamin and mineral status among women in Nepal.

While we are here, we will also ask you to go to the bathroom and collect urine in a small cup (equal to a few tablespoons). The cup is brand new and is not re-used. We will later test this urine to understand if people in Nepal eat enough of the mineral called iodine. Among nonpregnant women, we will also ask to leave a container with you overnight in order to collect a small stool sample (equal to a few tablespoons) that will be tested for helminths (worms) and other bacteria. We would very much appreciate your participation in this survey. For most participants, this survey will take about 1.5 hours to complete. For some non-pregnant women (about 3 out of 12), we will ask them to take part in a special test for vitamin A that lasts about 4 hours. If you are chosen for this test, after you give blood then you will be given a few drops of vegetable oil mixed well with a few drops of vitamin A. After 4 hours, the team will return to your house to collect blood (equal to about 1 teaspoon) into a small tube from a vein in your arm. This blood is used to confirm the results of the vitamin A test from the blood collected earlier in the day.

There is low risk if you participate in this survey. There is a small chance that some of the questions we ask or being asked to give a urine or stool sample might cause emotional discomfort or distress. If there are questions that you are not comfortable with, you are free to refuse to answer and you can refuse to give the blood, urine or stool samples. There is a small chance that you may have some physical discomfort from the needle used to collect blood. Only trained staff persons specialized in blood collection will collect the blood. There will only be at most two attempts to collect the blood. Health problems that result from taking part in a survey like this are rare. Before the team leaves your house, they will give you the contact details for your local health clinic. They will also give you the contact details of the survey manager. You can use these contacts to talk about any problems you might have with taking part in this survey.

For participating in this survey, your household will receive a shawl, towel, toothpaste, toothbrush, soap and nail cutter.If you are selected for the special vitamin A test that takes approximately 4 hours, then you will also get a blanket. If you participate in the survey, the benefit to you for taking part in this survey is that you will get the results for height, weight, anemia, malaria, and Visceral leishmaniasis (Kala-azar).The information you give us with the questions and other tests from the blood, urine and stool will not directly benefit you. We will add the information you give us to that of other participants in the survey and create a report.

This report will tell us about the health and nutrition of people in Nepal. Also, this report will guide the MoHP in their work to improve health and nutrition programs for people in Nepal.

We will keep your name hidden from people not involved in this survey. All names will be replaced with a number. No one will be able to link the answers to questions to you and all of the results will be shown in the report for the entire group.
Remember that you do not have to be in this survey. You can choose if you want to volunteer. You can also take part in some of the survey, and refuse to participate with other parts of the survey. Would you like to ask me any questions about this survey?

## Nepal National Micro-nutrient Status Survey (NNMSS), 2016

 Informed Written Consent - for Non-Pregnant and Pregnant Women 15 to 49 YearsPlease complete this form after you have read the information sheet to the targeted participant

Title of Research Project: Nepal National Micronutrient Status Survey (NNMSS)
Thank you for your interest in taking part of the NNMSS. Before you agree to take part, we must explain the survey project to you.

If you have any questions arising from the explanation already given to you, please ask questions to help you decide whether to join in. You may get a copy of this Consent Form to keep and read at any time.

## Participant's Statement

I $\qquad$

- have read/listened to the notes written above and the explanation, and understand what the survey involves.
- understand that if I decide at any time that I no longer wish to take part in this survey, I can stop at any time and withdraw immediately.
- agree to have my personal information included for the purpose of the survey.
- understand that such information will be kept safe and not shared with anyone outside the survey.
- agree that the survey has been explained to me to my satisfaction and agree to take part in this survey.
- understand that the information will be combined with the information from other participants and published as a report. Confidentiality will be maintained and it will not be possible to identify me from any publications.
- am assured that the confidentiality of my personal information will be upheld by not including the name or any other identifying information.

Participant's Name: $\qquad$ Participant's Age: $\qquad$ Years
Signed:
Date:

Parent/Legal guardian's Name: $\qquad$ (If participant's age is under 18 years)
Signed: Date:Witness Name:
$\qquad$ (If participant is illiterate)Signed:
Date:
Field Researcher.

$\qquad$
(this will be done immediately at the field)
Name: ..... Post:
Signed: Date:
One of the Co-Investigator of the Research Study

$\qquad$
(this willbe done later on)Name:Post:Signed:Date:


| E. GENERAL CHARACTERISTICS OF RESPONDENT |  |  |  |
| :---: | :---: | :---: | :---: |
| Q.NO. | QUESTIONS AND FILTERS | CATEGORIES AND CODE | SKIP TO |
| E021 | In what month and year were you born? |  |  |
| E022 | How old were you at your last birthday? <br> CHECK E021 | Age in completed years $\square$ Don't know $\qquad$ 98 |  |
| E023 | Have you ever attended school? | $\left.\begin{array}{\|l\|l\|} \hline \text { Yes ..................................................... } 1 \\ \text { No.................................................... } 2 \end{array} \right\rvert\,$ | $\rightarrow$ E026 |
| E023.1 | Only ask theadolescentrespondent of age 15-49 years <br> In the past 12 months, have you participated in school's health and nutrition programme? <br> ( If the respondent could not response this , ask to parents/adults) |  |  |
| E024 | What is the highest grade you completed? <br> If completed less than one grade, record ' 00 ' $10=$ SLC pass <br> 11 = Certificate Level (IA/ICom) <br> $12=$ Bachelor Level (BA/BCom) <br> 13 = Master Level and above | Grade. $\square$ |  |
| E025 | GRADE 5 FOR LOWER |  |  |
| E026 | Now I would like you to read this sentence to me. <br> Show card to respondent. <br> If respondent cannot read whole sentence, probe: <br> Can you read any part of this sentence to me? |  |  |
| E027 | What is your caste/ethnicity? |  |  |



| F. VITAMIN AND MINERAL SUPPLEMENT INTAKE YESTERDAY |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Since yesterday did you consume a: $\qquad$ (circle the correct answer) | Yes, Observed | Yes, Not Observed | No | Don't <br> Know |
| F027 | Multivitamin or multiple micronutrient supplement? If yes, ask to see the package | 1 | 2 | 3 | 98 |
| F028 | Iron, such as iron tablets or iron syrup? <br> If yes, ask her to see the package. | 1 | 2 | 3 | 98 |
| F029 | Vitamin a? (show example) <br> If yes, ask her to show you the package. | 1 | 2 | 3 | 98 |
| F030 | Folic acid? <br> If yes, ask to see the package. | 1 | 2 | 3 | 98 |
| F031 | Within the last 7 days, did you take a zinc tablet? <br> Show example. <br> If yes, ask to see the package <br> If no or don't know, skip to F033 | 1 | 2 | 3 | 98 |
| F032 | On how many days over the last 7 days, did you take a zinc tablet? | No. of Days: |  |  |  |
| F033 | In the last 24 hours, did you take a zinc tablet? <br> Instruction: tell the woman that 24 hours is since yesterday at this time today. <br> If no, skip to F035 | 1 | 2 | 3 | 98 |
| F034 | How many hours ago did you consume the zinc tablet? If consumed less than one hour ago, write ' 00 ' |  | go: |  |  |
| F035 | Did you take any drug for intestinal worms in the last six months? <br> Show examples. | Yes, took at sch <br> Yes, somewhere <br> No. $\qquad$ <br> Don't know $\qquad$ | .............. <br> se |  | $\begin{aligned} & \ldots \ldots . .1 \\ & \ldots \ldots . . \\ & \ldots \\ & \ldots . . . \\ & \ldots \\ & \ldots \end{aligned}$ |
| F36 | Did you ever take a combined iron and folic acid tablet in the last six months? <br> Show examples. <br> Multiple choice apply. | Yes, from schoo <br> Yes, from fchv. <br> Yes, from moh <br> Yes, other sourc <br> No. $\qquad$ <br> Don't know $\qquad$ | ............................... $\qquad$ $\qquad$ $\qquad$ |  | $\ldots . . . . . \mathrm{A}$ $\ldots . . . . . . \mathrm{B}$ $\ldots$ $\ldots . . . . . .$. $\ldots$ $\ldots$ $\ldots$ |


| G. HEALTH HISTORY/MICRONUTRIENTS IN PREGNANCY |  |  |  |
| :---: | :---: | :---: | :---: |
| G001 | Are you pregnant now? |  |  |
| G002 | If yes, how many months are you pregant? | Number of Months |  |
| G003 | Have you given birth in the last five years? | Yes .................................................................................................................. No | G021 |
| G004 | Are you currently lactating/breastfeeding? |  |  |
| G005 | During your last pregnancy, did you have trouble with your vision? |  |  |
| G006 | During your last pregnancy, at what time of day did you have trouble with your vision? | Daytime only ........................................ 1 Night time only ............................... 2 Both day and night.......................... 3 Don't know ................................... 98 |  |
| G007 | During your last pregnancy, did you take any drug for intestinal worms? <br> Show examples. |  |  |
| G008 | During your last pregnancy, did you take any iron/folic acid tablets? <br> Show tablets. | Yes ................................................................................................................. 98No.................................Don't |  |
| G009 | If yes, where did you get the iron/folic acid tablets? <br> Multiple answers apply. |  | G011 |
| G010 | If no, why did you not take any iron/folic acid tablets during your last pregnancy? <br> Multiple answers apply. |  |  |
| G011 | How many iron/folic acid tablets did you take during your last pregnancy? | Number of tablets consumed..................... (IF 180 OR MORE TABLETS CONSUMED, SKIP TO G013) |  |


| G012 | Why did you not consume 180 iron/folic acid tablets during your last pregnancy? <br> Multiple answers apply | Did not have all 180 tablets. $\qquad$ A <br> Did not know I should take a total of 180 tablets. $\qquad$ B <br> I did not need them $\qquad$ C <br> Side effects $\qquad$ D <br> Forgot $\qquad$ E <br> Husband/family would not allow me to $\qquad$ . <br> Too expensive. $\qquad$ <br> Other (specify) $\qquad$ |  |
| :---: | :---: | :---: | :---: |
| G013 | After delivery of your last pregnancy, did you taken any iron/folic acid tablets? <br> Show tablets. | Yes $\qquad$ <br> No $\qquad$ <br> Don't know $\qquad$ | - G015 |
| G014 | If yes, where did you get the iron/folic acid tablets? <br> Multiple answers apply. | FCHV................................................... A Health Facility ..................................................................................................... X Pharmacy/Store............................ | $\} \mathrm{G} 016$ |
| G015 | If no, why did you not take any iron/folic acid tablets after delivery of your last baby? <br> Multiple answers apply. |  |  |
| G016 | How many iron/folic acid tablets did you take after delivery your last pregnancy? | Number of tablets consumed. . $\square$ (If 45 or more tablets consumed, skip to g018) |  |
| G017 | Why did you not consume 45 iron/folic acid tablets during yor last pregnancy? <br> Multiple answers apply. |  |  |
| G018 | Within 6 weeks (45 days) after delivery of your last pregnancy, did you receive a vitamin A dose? <br> Show vitamin a capsules | Yes ................................................................................................................................................................. No |  |
| G019 | During your last pregnancy (before baby was born), did a health care worker or FCHV talk to you about how to feed your baby? | Yes, health worker................................... 1 Yes, FCHV ........................................ 2 Yes, both health worker and FCHV................................................................................................................................ |  |


| G020 | After your last baby was born, did a health care worker or FCHV talk to you about how to feed your baby? | Yes, health worker.................................. 1 Yes, FCHV ................................................ 2 Yes, both health worker and FCHV....... 3 No................................................................................... 98 Don’t know ................. |  |
| :---: | :---: | :---: | :---: |
| G021 | Have you ever smoked cigarettes? | Yes ...................................................................................................... 1 No | $\rightarrow \text { G023 }$ |
| G022 | During the last 30 days, on average how many cigarettes did you smoke in a day? | Average number of cigarrettes... $\square \square$ Don't know........................................... 98 |  |
| G023 | Have you been ill with a fever at any time in the past 2 weeks? |  |  |
| G024 | Have you had an illness with a cough at any time in the last 2 weeks? |  |  |
| G025 | Have you had diarrhea in the last 2 weeks? |  |  |
| G026 | How many times in the past week (7 days) have you eaten clay, earth, or termite mounds? <br> If never eaten enter ' $\mathbf{0} \mathbf{0}^{\prime}$ | Number of times consumed |  |
| G027 | How many times in the past week (7 days) have you eaten uncooked rice, starch, ice? <br> If never eaten enter ' $00^{\prime}$ | Number of times consumed $\square$ |  |


| H. CONTRACEPTION USE |  |  |  |
| :---: | :---: | :---: | :---: |
| H001 | Are you currently doing something or using any method to delay or avoid getting pregnant? <br> Show vitamin A capsules. | Yes ............................................................................................... 2 No ............. Don't know ........................................... 98 | Sec. I |
| H002 | Which method are you using? |  |  |

Interview end time:


| I. ANTHROPOMETRY |  |  |  |
| :---: | :---: | :---: | :---: |
| Measure | I001 <br> Result of Measurement | I002 <br> Measure | 1003 Person who did measuring |
| A. Height (Centimeters) | Measured ............. 1Not present............. 2Refused ............ 3Other_ $\quad$(Specify) |  | Code: $\square$ <br> Name |
| B. Weight (Kilograms) | Weighed............... 1 <br> Not present.............. 2 <br> Refused .............. 3 <br> Other .............. 96 <br> (Specify) | kg | Code: $\square$ <br> Name |




## MRDR VENOUS Blood Sample (ONLY NON-PREGNANT WOMEN ARE ELIGIBLE)

## Verification of process for taking sample

Instructions: Vitamin A2 will be administered to a preselected subsample of women. You must return to the woman's home 4 hours after Vitamin A2 administration to collect a venous blood sample.

| I023 | Woman selected for MRDR subsample | Yes ..................... 1 | No...................... 2 |
| :---: | :---: | :---: | :---: |
| I024 | Consent obtained | Yes ..................... 1 | No...................... 2 |
| I025 | Counseled woman | Yes ..................... 1 | No...................... 2 |
| I026 | Sample taken | Yes,compelely $\qquad$ <br> Yes, partially $\qquad$ <br> No. $\qquad$ <br> Refused. $\qquad$ | .......................................................................................................................................... 4 |
| I027 | Time MRDR blood collection (Hour: minute) |  |  |
| I028 | Date sample taken (Day/Month/Year) |  $\square$ |  |
| Time of Second Test for MRDR |  |  |  |
| I029 | Time dose of Vit A2 ingested |  |  |
| I030 | Time MRDR blood collection (Hour: minute) |  |  <br> Minute |


[^0]:    ${ }^{\text {a }}$ Hemoglobin is adjusted for altitude, and for smoking among individuals 10 y and older
    ${ }^{\mathrm{b}}$ Ferritin is adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction

[^1]:    ${ }^{1}$ Based on the population of 26.5 million in 2011, adjusted for an annual population growth rate of 1.35 percent as reported in Census 2011.

[^2]:    ${ }^{2}$ The sample weights are discussed in detail in section 2.3.

[^3]:    ${ }^{3}$ Incentives were included in the survey for those selected for MRDR in order to minimize loss to follow-up.

[^4]:    ${ }^{\text {a For }}$ ELISA which provides ferritin, sTfR, RBP, CRP, AGP
    ${ }^{\text {b }}$ Namaste SM, Aaron GJ, Varadhan R, Peerson JM, Suchdev PS; BRINDA Working Group. Am J Clin Nutr. 2017;106(Suppl 1):333S-347S.
    ${ }^{\text {}}$ Franceschi F, Annalisa T, Teresa DR, Giovanna D, Ianiro G, Franco S, Viviana G, Valentina T, Riccardo LL, Antonio G. World J Gastroenterol. 2014. ;20(36):12809-17.
    ${ }^{\text {d }}$ Naing C, Whittaker MA, Nyunt-Wai V, Reid SA, Wong SF, Mak JW, Tanner M. Trans R Soc Trop Med Hyg. 2013;107(11):672-83. ${ }^{\text {e WHO }}$. Prevention and control of schistosomiasis and soil-transmitted helminthiasis: a report of a WHO expert committee. Assessed on 7 February 2013 at: http://whqlibdoc.who.int/trs/WHO_TRS_912.pdf. Classes of intensity are based on epg (eggs per gram) of stool according to WHO guidelines.
    ${ }^{\text {f }}$ Engle-Stone R, Williams TN, Nankap M, Ndjebayi A, Gimou MM, Oyono Y, Tarini A, Brown KH, Green R. Nutrients. 2017 Jul 3;9(7). ${ }^{\text {s }}$ WebMD. Complete Blood Count (CBC). Assessed on 5 February 2013 at: http://www.webmd.com/a-to-z-guides/complete-blood-count-cbc ${ }^{\mathrm{h}}$ For blood disorder indicators, hemoglobin does not need to be adjusted for altitude or smoking

[^5]:    NA, Not applicable
    ${ }^{\text {a }}$ Percentage based on interview completed

[^6]:    ${ }^{4}$ Improved Source of drinking water: Include piped water, public tabs, standpipes, tubewells, boreholes, protected dug wells and springs, rainwater, and bottle water.
    ${ }^{5}$ Improved toilet facilities: Include flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit latrines; pit latrines with slabs; and compositing toilets.

[^7]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\mathrm{b}}$ Includes those who have completed $0-5$ years of school.

[^8]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^9]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed $0-5$ years of school.
    ${ }^{\text {C Includes those who have completed 6-9 years of school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^10]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Both male and female household head.

[^11]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.

[^12]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Improved toilet facility, shared and not shared: flush/pour flush to piped sewer system, septic tank, or pit latrine; ventilated improved pit (VIP) latrine; Pit latrine with slab; composting toilet.
    ${ }^{\text {b }}$ Not improved toilet facility, shared or not shared: flush/pour flush not to piped sewer system, septic tank, or pit latrine; pit latrine without without slab/open pit.
    ${ }^{\mathrm{c}}$ No facility/bush/field.

[^13]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those reporting household has mosquito net for sleeping.

[^14]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who own animals.

[^15]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    Includes those who have never attended school.
    Includes those who have completed 0-5 years of school.
    Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^16]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Consumption of clay, earth, termite mounds, uncooked rice, starch or ice
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {C Includes those who have completed 0-5 years of school. }}$
    ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^17]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    ${ }^{\text {as }}$ Such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice-cream
    ${ }^{\text {b }}$ Such as soft drinks, juice drinks, and other drinks with added sugar purchased from market
    ${ }^{\text {'S Such }}$ as soft drinks, juice drinks, and other drinks with added sugar made at home
    ${ }^{\mathrm{d}}$ Tea mixed with ghee and salt

[^18]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^19]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    ${ }^{\text {a }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card. Other includes: blind/visually impaired and sentence not available in required language.
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^20]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {CII Includes those who have completed 6-9 years of school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^21]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^22]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card.
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {c Includes those who have completed 0-5 years of school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^23]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing dat
    P-value obtained from Pearson's chi-square test.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who consumed any iron and folic acid tablets during pregnancy in the last 5 years.
    ${ }^{6}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card.
    'Includes those who have never attended school.
    dIncludes those who have completed $0-5$ years of sc
    Includes those who have completed 0-5 years of school.
    eIncludes those who have completed 6-9 years of school.

[^24]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who gave birth in last 5 years
    ${ }^{\mathrm{b}}$ Those with less than a $5^{\text {th }}$ year completed education asked to read a sentence on a card.
    ${ }^{\text {c I Includes those who have never attended school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^25]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^26]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    CRP, C-reactive protein; AGP, alpha-1-acid glycoprotein.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ ELISA
    ${ }^{\text {b }}$ Thurnham et al 2003
    'Includes those who have never attended school.
    ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school
    Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^27]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {c I Includes those who have completed 6-9 years of school }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^28]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample sizes might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Any worm infestation: either Ascaris lumbricoides, Trichuris trichura, or Hookworms
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {c I Includes those who have completed 0-5 years of school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^29]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample sizes might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Any worm infestation: either Ascaris lumbricoides, Trichuris trichura, or Hookworms
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {C Includes those who have completed 0-5 years of school. }}$
    ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^30]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    z-scores are calculated using 2006 WHO growth standards.
    CI-Confidence Interval
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {CIncludes those who have completed 6-9 years of school. }}$
    ${ }^{\text {d }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^31]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    z-scores are calculated using 2007 WHO growth reference 5-19 years.
    CI-Confidence Interval
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed 0-5 years of school.
    'Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{d}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^32]:    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.

[^33]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    z-scores are calculated using 2007 WHO growth reference 5-19 years.
    CI-Confidence Interval
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed $0-5$ years of school.
    ${ }^{\text {CIncludes those who have completed 6-9 years of school. }}$
    ${ }^{\text {d }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^34]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^35]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    Ferritin was not normally distributed and is reported as a geometric mean.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ ELISA; Erhardt et.al. 2004.
    ${ }^{\mathrm{b}}$ UNICEF, United Nations University, WHO 2001.
    ${ }^{\text {c Ferritin adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted. }}$
    ${ }^{\mathrm{d}}$ Hemoglobin concentrations adjusted for altitude. WHO 2011.
    ${ }^{\mathrm{e}}$ Includes those who have never attended school.
    ${ }^{\text {f }}$ Includes those who have completed 0-5 years of school.
    gincludes those who have completed 6-9 years of school.
    ${ }^{h}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^36]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on $25-49$ unweighted cases.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size for adolescent boys designed to only be nationally representative.
    Sample size might vary slightly due to missing data
    P-value obtained from Pearson's chi-square test.
    P-value obtained from Pearson's chi-square test.
    a Hemoglobin concentrations are adjusted for altitude and smoking. WHO 2011.
    ${ }^{\circ}$ Any anemia defined as children 5-11 y $<11.5 \mathrm{~g} / \mathrm{dL}$, children $12-14 \mathrm{y}<12.0 \mathrm{~g} / \mathrm{dL}$ \& women $15-49 \mathrm{y}<12.0 \mathrm{~g} / \mathrm{dL}$.
    ${ }^{\mathrm{c}}$ Mild anemia defined as children $10-11$ y $11.0-11.4 \mathrm{~g} / \mathrm{dL}$, children $12-14$ y $11.0-11.9 \mathrm{~g} / \mathrm{dL}$, \&women $15-19 \mathrm{y} 11.0-11.9 \mathrm{~g} / \mathrm{dL}$
    ${ }^{\mathrm{d}}$ Moderate anemia defined as hemoglobin 8.0-10.9 g/dL
    ${ }^{\text {e }}$ Severe anemia defined as hemoglobin $<8.0 \mathrm{~g} / \mathrm{Dl}$
    ${ }^{\text {f Includes those who have never attended school. }}$
    ${ }^{\text {s }}$ sincludes those who have completed 0-5 years of school.
    ${ }^{\text {i }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^37]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    Sample size might vary slightly due to missing data.
    Ferritin was not normally distributed and is reported as a geometric mean.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a}}$ ELISA; Erhardt et.al. 2004.
    ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001.
    ${ }^{c}$ Ferritin adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\mathrm{d}}$ Hemoglobin concentrations adjusted for altitude and smoking. WHO 2011.
    ${ }^{\text {e }}$ Includes those who have never attended school.
    ${ }^{\text {f }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {g }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {h }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^38]:    Note: N un weighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on
    P-value obtained from Pearson's chi-square test
    ${ }^{1}$ Hemoglobin concentrations are adjust
    Includes those who have never attended school.
    Includes those who have completed 0-5 yers of school.
    ${ }^{\text {I Includes }}$ those who have completed 6-9 years
    ${ }^{\text {I Includes those who have completed 6-9 years of school. }}$
    eIncludes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^39]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data.
    Ferritin was not normally distributed and is reported as a geometric mean.
    P-value obtained from Pearson's chi-square test.
    ${ }^{a}$ ELISA; Erhardt et.al. 2004.
    bUNICEF, United Nations University, WHO 2001.
    ${ }^{\text {c }}$ Ferritin adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\mathrm{d}}$ Hemoglobin concentrations adjusted for altitude and smoking. WHO 2011.
    ${ }^{\mathrm{e}}$ Includes those who have never attended school
    ${ }^{\mathrm{f}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {I }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{h}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^40]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^41]:    Note: N unweighted. All estimates account for weighting and complex sample design.,
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Sample size for pregnant women designed to be only nationally representative
    For all stratifications, no significant test were performed because small sample size Ferritin was not normally distributed and is reported as a geometric mean.
    ${ }^{\text {a }}$ ELISA; Erhardt et.al. 2004.
    ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001.
    ${ }^{\text {c }}$ Ferritin adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\text {d }}$ Hemoglobin concentrations adjusted for altitude and smoking. WHO 2011
    ${ }^{\mathrm{e}}$ Includes those who have never attended school
    ${ }^{\text {f I Includes those who have completed 0-5 years of school. }}$
    ${ }^{\mathrm{g}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {h }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^42]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Tanumihardjo 2011.
    ${ }^{\text {b }}$ Includes those who have never attended school.
    ${ }^{\text {'Includes those who have completed 0-5 years of school. }}$
    ${ }^{d}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e I Includes tho }}$ those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^43]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Atomic absorption flame emission spectroscopy; Dipeitro ES et.al. 1988
    ${ }^{\mathrm{b}}$ IZINCG 2007. Zinc deficiency defined as serum zinc less than 66 or $59 \mu \mathrm{~g} / \mathrm{dL}$ depending on time of day: Morning (until noon), non-fasting:
    $<66 \mu \mathrm{~g} / \mathrm{dL}$; Afternoon, non-fasting: $<59 \mu \mathrm{~g} / \mathrm{dL}$
    ${ }^{\mathrm{c}}$ Includes those who have never attended school.
    ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{f}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^44]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    Sample size might vary slightly due to missing data
    P-value obtained from Pearson's chi-square test. 2011.
    aMicrobiological assay; O’ Broin S and Kelleher B 1992; Pfeiffer et al 2011.
    ${ }^{\text {b }}$ WHOO, 2012. Deficiency defined as RBC folate $<226.5 \mathrm{nmol} / \mathrm{L}$ using macrocytic anemia as a hematological indicator.
    ${ }^{\text {Wh }}$ WHO, 2012. Risk of Deficiency defined as RBC folate $<305 \mathrm{nmol} / \mathrm{L}$.
    ${ }^{\text {d}}$ WHO, 2015. Insufficiency defined as RBC folate $<906 \mathrm{nmol} / \mathrm{L}$.
    ${ }^{\text {e Includes those who have never attended school. }}$
    Includes those who have never attended school.
    ${ }^{8}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {h }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate

[^45]:    Note: N unweighted. All estimates account for weighting and complex sample design.

[^46]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Sample size for pregnant women designed to be only nationally representative.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Includes those who have never attended school.
    ${ }^{\text {b }}$ Includes those who have completed $0-5$ years of school.
    ${ }^{\text {CIncludes those who have completed 6-9 years of school. }}$
    ${ }^{\text {e Includes those who }}$ whe completed 10 and more years of school. SLC: School Leaving Certificate

[^47]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Asked for each type of salt used in households

[^48]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household uses salt type
    ${ }^{\mathrm{b}}$ Among those who reported they had salt the day of the survey
    ${ }^{\text {c A Among those with observed salt }}$

[^49]:    Note: Both Ns and estimates are unweighted.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household uses crushed salt
    ${ }^{\mathrm{b}}$ Among those who reported they had salt the day of the survey
    ${ }^{\text {c Ammong those with observed salt }}$

[^50]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.

[^51]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data
    Maida purchased: roller mill refined wheat flour
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household uses this type of wheat flour
    ${ }^{\text {b }}$ Among those who reported they had wheat flour the day of the survey
    ${ }^{\text {c Among those with observed wheat flour in the original packaging }}$

[^52]:    Note: Both Ns and estimates are unweighted.

[^53]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data
    Maida purchased: Roller mill refined wheat flour
    Atta purchased: Roller mill or large commercial chakki milled wheat flour
    P-value obtained from Pearson's chi-square test. Significant test did not perform on some of the stratifications due to small sample size.
    ${ }^{\text {a }}$ Analyzed by the iron spot test.

[^54]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    ${ }^{\text {a }}$ Analyzed by the AOAC International Official Method 999.11. Standard method for quantitatively determining iron in flour using dry asking and flame atomic absorption spectrometry (FASS)

[^55]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ AOAC International Official Method 999.11 standard method for quantitatively determining iron in flour using dry asking and flame atomic absorption spectrometry (FASS)

[^56]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Atta purchased: Roller mill or large commercial chakki milled wheat flour
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ AOAC International Official Method 999.11 Standard method for quantitatively determining iron in flour using dry ash and flame atomic absorption spectrometry (FASS). AOAC methods tested among those with positive iron spot test and among a random subset of those that tested negative with iron spot test.

[^57]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    $P$-value obtained from Pearson's chi-square test.

[^58]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Significant test did not perform due to small sample size.
    ${ }^{\text {a }}$ Among those who reported household uses cooking oil and sunflower oil is main type used
    ${ }^{\mathrm{b}}$ Among those who reported they had cooking oil the day of the survey
    ${ }^{\text {c A Among those with observed cooking oil in the original packaging }}$

[^59]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution.
    Prevalence estimates in parentheses based on a sample serisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[^60]:    Note: Both Ns and estimates are unweighted.
    Prevalence estimates in parentheses based on a sample size of 25-49 and should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Significant test did not perform due to small sample size.
    ${ }^{\text {a Among those who reported household uses cooking oil and soybean oil is main type used }}$
    ${ }^{\text {b }}$ Among those who reported they had cooking oil the day of the survey
    ${ }^{\text {c }}$ Among those with observed cooking oil in the original packaging

[^61]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Asked among those reporting household consumes rice type

[^62]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    ${ }^{\text {a }}$ Asked for rice used in households.
    ${ }^{\text {b }}$ Per-capita daily availability was calculated based on the quantity each household purchase for each day divided by the total number of household members.

[^63]:    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer
    Sample size might vary slightly due to missing data
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household uses rice

[^64]:    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution

[^65]:    Note: N unweighted. All estimates account for weighting and complex sample design
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household consumes rice type.
    ${ }^{\text {b }}$ Among those who reported they had rice the day of the survey.
    ${ }^{\text {c Among those with observed rice type in the original packaging. }}$

[^66]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data
    P -value obtained from Pearson's chi-square test.

[^67]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Sample size might vary slightly due to missing data.
    Figures in parentheses are based on $25-49$ sample size and the estimate should be interpreted with caution. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ Among those who reported household uses biscuits
    ${ }^{\text {b }}$ Among those who reported they had biscuits the day of the survey
    ${ }^{\text {c }}$ Among those with observed they had biscuits the day of the survey

[^68]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
    Sample size might vary slightly due to missing data.
    Ferritin was not normally distributed and is reported as a geometric mean
    P-value obtained from Pearson's chi-square test.
    ${ }^{a}$ ELISA; Erhardt et al 2004.
    bUNICEF, United Nations University, WHO 2001.
    ${ }^{\text {c }}$ Hemoglobin concentrations adjusted for altitude. WHO 2011.
    ${ }^{\mathrm{d}}$ Includes those who have never attended school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\mathrm{f}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{g}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^69]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed
    Sample size might vary slightly due to missing data.
    Sample size for adolescent boys designed to be only nationally representative.
    Ferritin was not normally distributed and is reported as a geometric mean
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    P-value obtained from Pearson's chi-square test.
    ${ }^{a}$ ELISA; Erhardt et al 2004.
    ${ }^{\mathrm{b}}$ UNICEF, United Nations University, WHO 2001.
    ${ }^{\text {'Hemegrobin concentrations adjusted for altitude and smoking. WHO } 2011 .}$
    ${ }^{\text {d I Includes tho }}$ the who have never attended school.
    ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
    Includes those who have completed 6-9 years of school.
    Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^70]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Ferritin was not normally distributed and is reported as a geometric mean
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {an }}$ ELISA; Erhardt et al 2004.
    ${ }^{\mathrm{b}}$ UNICEF, United Nations University, WHO 2001
    ${ }^{\text {ch}}$ Hemoglobin concentrations adjusted for altitude and smoking. WHO 2011.
    ${ }^{\text {d }}$ Includes those who have never attended school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {g }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^71]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Soluble Transferrin Receptor (sTfR) was not normally distributed and is reported as a geometric mean.
    P-value obtained from Pearson's chi-square test.
    ${ }^{a}$ ELISA; Erhardt et.al. 2004
    ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001
    ${ }^{\mathrm{c}}$ sTfR adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\mathrm{d}}$ Includes those who have never attended school.
    ${ }^{\text {e }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
    ${ }^{8}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^72]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Soluble Transferrin Receptor (sTfR) was not normally distributed and is reported as a geometric mean.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a}}$ ELISA; Erhardt et.al. 2004
    ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001
    ${ }^{\mathrm{c}}$ sTfR adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\mathrm{d}}$ Includes those who have never attended school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\mathrm{g}}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^73]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    Soluble Transferrin Receptor (sTfR) was not normally distributed and is reported as a geometric mean.
    For all strifitications, no significant test were performed because small sample size.
    *Some are co-existed with $\alpha$ and $\beta$ Thalassemia
    ${ }^{\text {a }}$ ELISA; Erhardt et al 2004
    ${ }^{\text {b }}$ UNICEF, United Nations University, WHO 2001
    ${ }^{c}$ sTfR adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) regression correction.
    ${ }^{\text {d}}$ Includes those who have never attended school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 6-9 years of school.
    ${ }^{8}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^74]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$.
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {c I Includes }}$ those who have completed $0-5$ years of school.
    ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^75]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$.
    ${ }^{\text {b }}$ RBP adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted.
    ${ }^{\text {c I Includes those who have never attended school. }}$
    ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^76]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    a No retinol was collected among adolescents and the RBP cut off for women of reproductive age was applied to adolescents. A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$ among women of reproductive age.
    ${ }^{6}$ RBP adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted
    ${ }^{\text {c }}$ Includes those who have never attended school.
    ${ }^{\mathrm{d}}$ Includes those who have completed 0-5 years of school.
    ${ }^{\mathrm{e}}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^77]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 unweighted cases.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P -value obtained from Pearson's chi-square test.
    ${ }^{\text {a }}$ CDC, 2018.
    ${ }^{\text {b }}$ RBP adjusted for inflammation using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) adjusted.
    ${ }^{\text {c Includes those who have never attended school. }}$
    ${ }^{\text {d }}$ Includes those who have completed 0-5 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {f }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

[^78]:    Note: N unweighted. All estimates account for weighting and complex sample design.
    Figures in parentheses are based on 25-49 sample size and the estimate should be interpreted with caution.
    An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
    Sample size might vary slightly due to missing data.
    P-value obtained from Pearson's chi-square test.
    ${ }^{a}$ A linear regression was used to calculate the RBP cut off equivalent to retinol $<0.70 \mu \mathrm{~mol} / \mathrm{L}$.
    ${ }^{\mathrm{b}}$ Includes those who have never attended school.
    ${ }^{\text {c Includes those }}$ tho have completed 0-5 years of school.
    ${ }^{\text {d }}$ Includes those who have completed 6-9 years of school.
    ${ }^{\text {e }}$ Includes those who have completed 10 and more years of school. SLC: School Leaving Certificate.

